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# Lab Characterization of Near- Surface Soils from Farm to Market Road 2

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# Lab Characterization of Near- Surface Soils from Farm to Market Road 2

**by**

**Shivangi Jain**

## Report

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# Dedication

In the loving memory of my grandfather, Jai Kumar Jain. You will always be missed.

To my Parents, what all I am and what I can be in the future, is all because of your countless efforts. Thank you for believing in me.

## Acknowledgements

First and foremost, I would like to thank Dr. Jorge G. Zornberg who helped me throughout my journey in graduate school. I cannot imagine reaching to the end without his constant support. I sincerely appreciate him for providing me the opportunity to work with him on various small projects and this report.

I would like to further thank my mentor Dr. Prateek Negi who introduced me to the field of Geotechnical Engineering. Without his guidance and support, I would not have opted to pursue further education.

My sincere gratitude goes to all the professors I have taken classes with. Thank you for the knowledge I gained from the courses and the wise words that helped me outside of classroom as well.

Next, I would like to mention my fellow researchers who helped me throughout the testing the program. Dr. Chris Armstrong for training me in the soil tests, Calvin Blake for helping constantly with the tests and equipment and providing valuable suggestions, Karly Summerlin for providing me her test data that helped me immensely, and Federico for helping me sort out any minor and major issues with the lab equipment.

Lastly, I would like to thank my family, my sister for always having my back and friends, for their constant support in my grad school journey. Thank you for supporting me throughout and encouraging me to push myself to give my best.

# Abstract

## Lab Characterization of Near- Surface Soils from Farm to Market Road 2

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The University of Texas at Austin, 2019

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Distresses in pavements is a common issue in the state of Texas. Various research and mechanisms have been developed to study the performance of the pavements in the recent years. One of the major types of distress is longitudinal cracking caused by various environmental factors. These factors have been studied previously by many researchers, (Zornberg, Gupta, & Ferreira, Field performance of geosynthetic reinforced pavements over expansive clay subgardes, 2010), (Zornberg, Ferreira, & Roodi, Geosynthetic-Reinforced Unbound Base Courses: Quantification of the Reinforcement Benefits , 2013). One such factor is the expansive subgrade over which a pavement is constructed. The subgrade when wet, swells and shrinks when it gets dry. This swelling and shrinkage in different seasons causes significant cracking on the pavement surface as the subgrade moves. This affects especially the shoulders of the roadway as it is where the subgrade has the most chance to move.

There are many ways for the characterization of the subgrade soil, for example in terms of strength, shear or swelling and shrinkage. For this research, the focus was on characterization in terms of swelling. For this, the process started with initial measurements (moisture content, density and suction), then index properties were calculated (Atterberg Limits) before running the centrifuge tests to get the stress-swell curves. One major common factor that affects the characterization is the initial conditions. If we start with wrong dry conditions, chances of getting over or underestimated results are high. This report reviews the co-relation used to get the dry initial conditions and further tests to characterize the soil.

Sample borings were taken from 16 locations corresponding to the first 16 tests sections monitored in the previous research. (Zornberg, Ferreira, & Roodi, Geosynthetic-Reinforced Unbound Base Courses: Quantification of the Reinforcement Benefits , 2013) on the Farm to Market road 2 up to 10ft depth where each interval was 2ft. Initially the borings were weighed and measured to get an estimate of the volume and hence density and the initial moisture content was measured. Atterberg limits tests were conducted to get the dry conditions using the Tex-124-E correlation. Later, the borings were tested for their swelling potential using the centrifuge technique to match the in-situ stress and eventually get the stress-swell curves. Later on, the data collected in this reported will be used to calculate the Potential vertical Rise of these locations and eventually those PVR values will be used to correlate the subgrade soil behavior and performance of the pavements.

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# Chapter 1: Introduction

## 1.1 MOTIVATION

Expansive soils are defined as the type of rocks or soil that undergo significant volumetric changes with fluctuations in the moisture content. The soils swell when they move from dry to a wet state, and shrink when water content reduces to a relatively dry state from a wet state. This change results in the uneven movement of the ground which can cause severe damage to the structures or pavements constructed on them. Expansive soils cause significant damage to pavements particularly. (Nelson & Miller, 1997). In the 1970's, the annual cost of damage to streets and highways caused by expansive soils was estimated to exceed $1 billion. (A Quarter Century of Geotechnical Research, 1999). Expansive soils are quite prevalent in almost all of the US including the state of Texas, as shown in Figures 1 and 2.


*Figure 1 Expansive Clays in the US.*

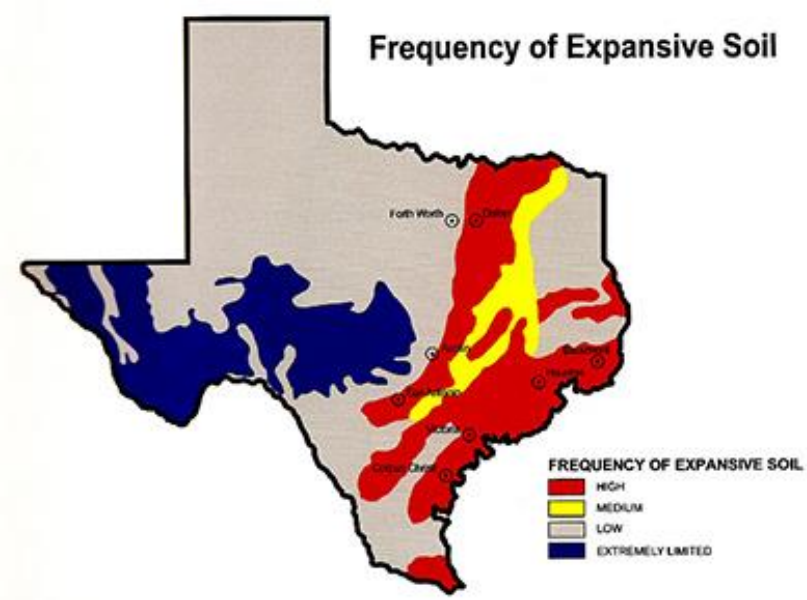



*Figure 2 Expansive Soils in Texas (Tella Firma Foundations, n.d.).*

The movement of expansive subgrades beneath the pavements can cause severe damages to the pavements. Thorough research has been done on studying the swelling and shrinkage properties of the subgrades to estimate the extent to which the subgrade will swell or settle. To understand those properties, it is very important to characterize the subgrade soils.

## 1.2 OBJECTIVES AND SCOPE

The main objective of this research is to characterize the subgrade soils from the Farm to Market 2 road and get the stress swell curves matching the in-situ soil layering. To achieve these objectives, soil samples were collected from the subgrade layers of pavements from the FM 2 road in Grimes County, Texas.

To prepare the samples for the centrifuge tests to get the Stress- Swell curves, initial Atterberg limits tests were conducted. Results from the Atterberg limits tests were used to determine the initial moisture conditions of the soil samples. The data from the centrifuge tests was used to obtain the stress-swell curves.

## 1.3 REPORT OVERVIEW

The report includes seven chapters and two appendices. Chapter 1 presents the motivation, objectives and scope of the research. Chapter 2 gives the background overview and literature review of the research previously done on expansive soils. Chapter 3 details the Centrifuge technique. Chapter 4 presents the location of the FM 2 road. Chapter 5 describes the analysis of the results. Lastly, Chapters 6 and 7 sum up the inferences and future recommendations for the study. The appendices present the description of the results from the Atterberg limits tests and the centrifuge tests.

# Chapter 2: Background

## 2.1 Initial Conditions

For characterization of any soil it is utterly important to get the initial conditions right. If these conditions are not estimated correctly, the end results can have large errors in the estimate.

For this research the challenge was to get precise values of dry conditions with limited amount of soil samples as proctor tests were not a feasible option to get the right initial moisture content and densities. Previously (Snyder, 2015) tried using the proctor tests to get the OMT curve for samples and defined certain correlations to replace proctor tests in case where quantities of samples were limited. There are various correlations proposed for getting the dry moisture content values to get to the start point to find swell potential of any given soil. If the tests are done on significantly wet samples, the swell values will be under-estimated. Therefore, it is necessary to pick the right correlation.

There are various correlations proposed to calculate the optimum moisture content using the Atterberg Limits data, such as NAVFAC, USACOE, Al-Khafaji and the Tex-124-E reported by (Snyder, 2015). The Tex-124-E, given by McDowell (McDowell, 1956) however, gives the dry condition rather than the optimum moisture content. The dry condition can be defined as the minimum moisture content at which soil will show swell potential. The figure below shows how the data collected by McDowell lies above the line of his described equation. (Equation 1), validating that the line describes the dry condition for a given moisture content and Liquid Limit.

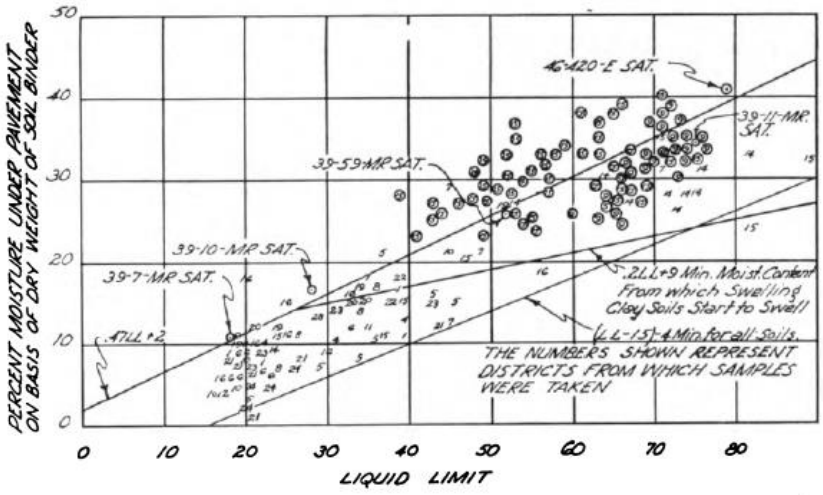



*Figure 3 Moisture data for subgrade soils under pavement (McDowell, 1956).*

Since this research focuses on obtaining the swell potential, the correlation in the Tex-124-E was selected to get the dry moisture content and all the other correlations giving the optimum moisture content were discarded. The reason to do so was that optimum moisture content with these correlations would give a value on the wetter spectrum of the soil strata and hence the tests would underestimate the swell potential. Therefore, it was decided to use dry moisture content instead of optimum moisture content.

The Tex-124-E dry moisture condition is given as equation 1.

$$w = 0.2 * LL + 9 \qquad \text{Equation 1}$$

where w is the dry water content in percent and LL is the liquid limit in percent.

## 2.2 ATTERBERG LIMITS

Atterberg limits tests are necessary as they give the basic idea of the soil behavior in terms of its plasticity index. By determining the Liquid and Plastic limits of the samples, the plasticity index can be calculated as:

$$PI = LL - Pl \qquad \text{Equation 2}$$

where, PI is Plasticity index, LL is Liquid limit and PL is Plastic Limit.

Together, the three values can be used to determine the soil type based on the Casagrande's chart. In general, if the soil is a high plasticity clay, it is considered to have a high swell potential as well. Liquid Limit is being used to calculate the dry conditions to which the samples shall be adjusted to as mentioned above (Equation 1).

Additionally, this information helps in finding the right representative intervals from a particular boring. For example, at any boring, five samples at an interval of 2ft each are extruded. Having the Atterberg Limits, and hence the Plasticity Indices, of all the samples will help in selecting the depths which have high plasticity for further swell tests as those samples will affect the swelling and shrinkage of the entire boring compared to the depths which have low plasticity soils.

## 2.3 STRESS SWELL CURVES

The stress swell curves show the highest a sample can swell under a particular stress. Generally, if the stress is high, the sample will swell less compared to samples

subjected to lower stresses. Therefore, it can be seen that deeper intervals will have less effect on the pavement performance compared to the samples taken from the top.

There are various methods to measure the swelling potential of the soil. For example, Free Swell Test, (ASTM D4546), The Centrifuge Method, (Zornberg, Plaisted, Armstrong, & Walker, 2013). For this research, The Centrifuge Method was used to get the stress-swell curves as it is faster to give the results compared to the conventional ASTM D4546 method.


*Figure 4 Example Stress-Swell Curve (Summerlin, 2018).*

# Chapter 3: Characterization Methods

## 3.1 Density and Moisture Content

To start with the process, representative portion was taken from each bore log to measure its length and diameter and hence the volume. It was then weighed and hence the density was calculated for the bore log. Some part was taken from the log to get the initial moisture content using the ASTM D2216 method.

## 3.2 Atterberg Limits

Representative samples were taken from the borings and air dried and processed to get the Atterberg Limits using the ASTM D4318 method. The values from the tests were used to plot the soils on the Casagrande's curve and the Liquid Limit results were used to get the dry conditions by using the Tex-124-E method. The plots for these tests are shown in Appendix A.

*Figure 5 Liquid limit test.*

### 3.3 CENTRIFUGE TESTS

Modified centrifuge technique (Summerlin, 2018) was used to finally get the stress swell values of each boring to characterize the soil samples for their swell potential. The procedure for the method is given as follows.

#### 3.3.1 Centrifuge Test Preparation

1. Slice the bore log in 6 pieces as this is the number of samples to be prepared from each depth.

*Figure 6 Slicing the bore logs and moisture adjustment.*

2. Moisture adjust the samples to a value equal to TxDOT dry condition given by TX 124 E:

$$w = 0.2 * LL + 9$$

For this, use plastic boxes with loose lids as the environment chamber where the lids are used to control the drying process (box can be covered partially or completely to monitor the drying of the samples).

Also, monitor the weight of the samples throughout to check when the target moisture content is reached.

3. Choose a target G-level that will result in an overburden stress close to the average stress on each sample at depth.
4. Begin sample preparation for centrifuge test:
   a) Obtain 6 of each: centrifuge buckets, plastic permeameter cups and bottoms, 2” cutting rings, bottom porous discs, and top porous discs. To obtain a stress-swell curve, it is recommended to use 2 small discs, 2 medium discs, and 2 large discs for the top porous discs.
   b) Trim top and bottom filter paper for each sample to fit inside the cutting ring.

*Figure 7 Cutting ring, filter paper, permeameter cup, centrifuge bucket, and porous discs.*

   c) Grease inside of cutting rings with vacuum grease. This is important to reduce the side friction on the samples. Samples prepared without greasing

the inside of the ring will swell significantly less than samples prepared with vacuum grease.

*Figure 8 Greasing process.*

d) Weigh permeameter cups and bottoms.

e) Weigh rings with filter paper, rings with filter paper and porous discs, and the top porous disc and filter paper. Record weights in corresponding spaces on test template.

f) Measure the height of the top porous disc and filter paper, and bottom porous disc and filter paper using dial gauge.

g) Trim the sample in a non-greased cutting ring to a target height of 0.393”.

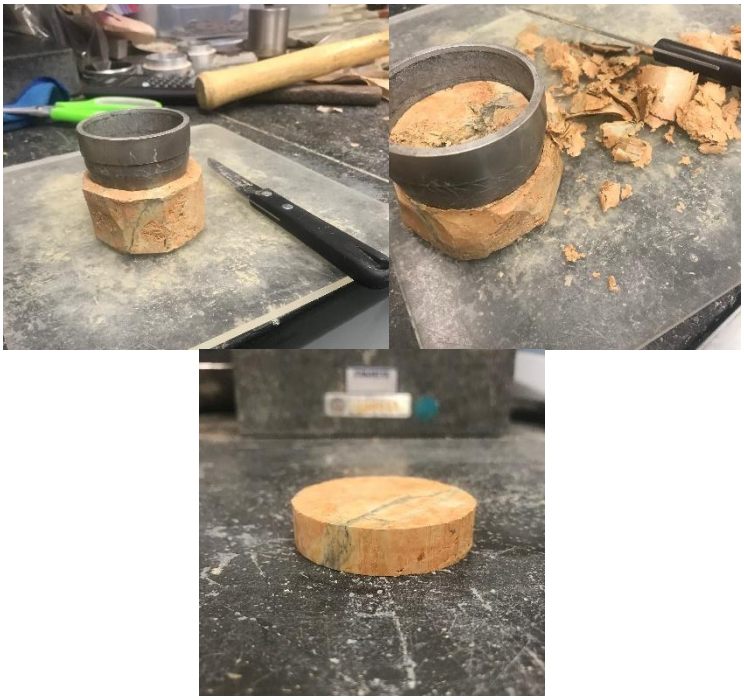


*Figure 9 Trimming process.*

h) Extrude the trimmed sample from the cutting ring, place it over bottom porous disc and filter paper and put the greased cutting ring on the sample.

*Figure 10 Placement of greased ring over the sample.*

i) Finally, place top filter paper and porous disc on sample. The trimming procedure is depicted below.

j) Measure the height in center and four corners of the sample along with the top filter paper and porous disc and ensure it does not vary more than +/- 0.005” across sample. Weigh the sample afterwards.

*Figure 11 Height measurement of sample.*

k) Place the sample inside permeameter and weigh.

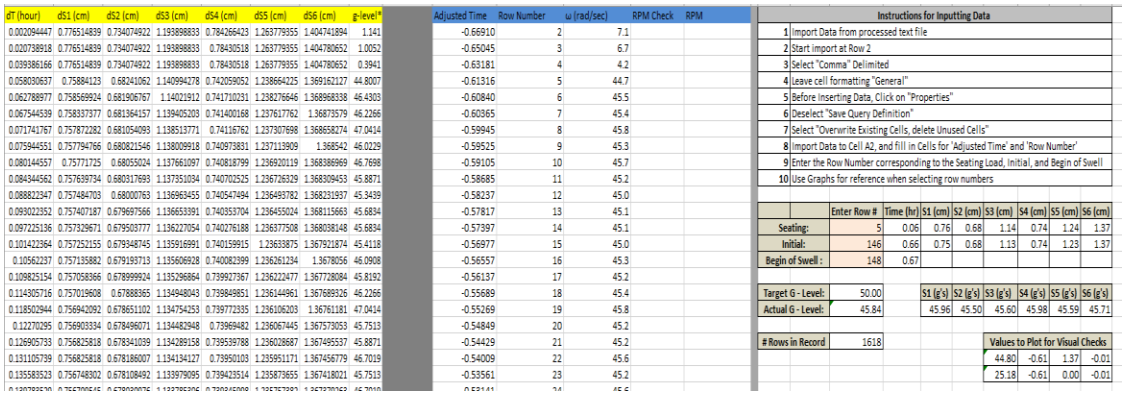
l) Weigh each permeameter and centrifuge bucket together. If the difference in mass between pairs exceeds 0.5g, adjust with foil or metal rings at the bottom of the centrifuge buckets. Place permeameters inside bucket over any foil or metal rings added. Record the height of the added foil or metal rings.

*Figure 12 Height measurement of metal ring.*

5. Place centrifuge buckets into centrifuge, with 1 opposite 2, 3 opposite 4, and 5 opposite 6 such that the centrifuge is balanced, and secure lids over buckets.
6. Start data logging system and set to target g-level and allow to compress for at least 1 hour or until height stabilizes.
7. After height stabilizes, stop centrifuge. Using a syringe, deliver approximately 100-102g water to each sample via the small hole in the top of the lid. This step should be performed expeditiously such that 1-g swelling is minimized.
8. Restart the centrifuge at target g-level and allow test to run for 24-72 hours or until samples have reached a reasonably constant height. Be sure that samples are well into the "secondary swell" stage so that this section of the plot will be visible on a logarithmic scale.
9. Stop the centrifuge and let the samples rebound as the stress is removed. Let the samples stay in the rebound stage for significant amount of time until they reach a stable height.
10. Stop data logger, remove and weigh complete centrifuge buckets.
11. Remove permeameters, wipe excess water from outside, and weigh.
12. Pour out excess water, remove soil rings from permeameter, and remove top and bottom porous discs, leaving filter paper on samples. Wipe excess water from ring and filter paper.
13. Weigh moisture content dish, then weigh dish with soil ring. Place in oven to dry overnight to a constant weight. Weigh dish with oven-dried soil ring.

### 3.3.2 Data Analysis

1. Input all data from centrifuge test sheet into corresponding cells in analysis spreadsheet.
2. Import text file with centrifuge data into spreadsheet.
3. Look at time-deflection data for each sample to ensure that it looks reasonable before including in analysis.



| dT (hour) | dS1 (cm) | dS2 (cm) | dS3 (cm) | dS4 (cm) | dS5 (cm) | dS6 (cm) | g-level* |
|---|---|---|---|---|---|---|---|
| 0.002094447 | 0.776514839 | 0.734074922 | 1.193898833 | 0.784266423 | 1.263779355 | 1.404741894 | 1.141 |
| 0.020738918 | 0.776514839 | 0.734074922 | 1.193898833 | 0.78430518 | 1.263779355 | 1.404780652 | 1.0052 |
| 0.039386166 | 0.776514839 | 0.734074922 | 1.193898833 | 0.78430518 | 1.263779355 | 1.404780652 | 0.3941 |
| 0.058030637 | 0.75884123 | 0.68241062 | 1.140994278 | 0.742059052 | 1.238664225 | 1.369162127 | 44.8007 |
| 0.062788977 | 0.758569924 | 0.681906767 | 1.14021912 | 0.741710231 | 1.238276646 | 1.368968338 | 46.4303 |
| 0.067544539 | 0.758337377 | 0.681364157 | 1.139405203 | 0.741400168 | 1.237617762 | 1.36873579 | 46.2266 |
| 0.071741767 | 0.757872282 | 0.681054093 | 1.138513771 | 0.74116762 | 1.237307698 | 1.368658274 | 47.0414 |
| 0.075944551 | 0.757794766 | 0.680821546 | 1.138009918 | 0.740973831 | 1.237113909 | 1.368542 | 46.0229 |
| 0.080144557 | 0.75771725 | 0.68055024 | 1.137661097 | 0.740818799 | 1.236920119 | 1.368386969 | 46.7698 |
| 0.084344562 | 0.757639734 | 0.680317693 | 1.137351034 | 0.740702525 | 1.236726329 | 1.368309453 | 45.8871 |
| 0.088822347 | 0.757484703 | 0.68000763 | 1.136963455 | 0.740547494 | 1.236493782 | 1.368231937 | 45.3439 |
| 0.093022352 | 0.757407187 | 0.679697566 | 1.136653391 | 0.740353704 | 1.236455024 | 1.368115663 | 45.6834 |
| 0.097225136 | 0.757329671 | 0.679503777 | 1.136227054 | 0.740276188 | 1.236377508 | 1.368038148 | 45.6834 |
| 0.101422364 | 0.757252155 | 0.679348745 | 1.135916991 | 0.740159915 | 1.23633875 | 1.367921874 | 45.4118 |
| 0.10562237 | 0.757135882 | 0.679193713 | 1.135606928 | 0.740082399 | 1.236261234 | 1.3678056 | 46.0908 |
| 0.109825154 | 0.757058366 | 0.678999924 | 1.135296864 | 0.739927367 | 1.236222477 | 1.367728084 | 45.8192 |
| 0.114305716 | 0.757019608 | 0.67888365 | 1.134948043 | 0.739849851 | 1.236144961 | 1.367688326 | 46.2266 |
| 0.118502944 | 0.756942092 | 0.678651102 | 1.134754253 | 0.739772335 | 1.236106203 | 1.36761181 | 47.0414 |
| 0.12270295 | 0.756903334 | 0.678496071 | 1.134482948 | 0.73969482 | 1.236067445 | 1.367573053 | 45.7513 |
| 0.126905733 | 0.756825818 | 0.678341039 | 1.134289158 | 0.739539788 | 1.236028687 | 1.367495537 | 45.8871 |
| 0.131105739 | 0.756825818 | 0.678186007 | 1.134134127 | 0.73950103 | 1.235951171 | 1.367456779 | 46.7019 |
| 0.135583523 | 0.756748302 | 0.678108492 | 1.133979095 | 0.739423514 | 1.235873655 | 1.367418021 | 45.7513 |

| Adjusted Time | Row Number | ω (rad/sec) | RPM Check | RPM |
|---|---|---|---|---|
| -0.66910 | 2 | 7.1 | | |
| -0.65045 | 3 | 6.7 | | |
| -0.63181 | 4 | 4.2 | | |
| -0.61316 | 5 | 44.7 | | |
| -0.60840 | 6 | 45.5 | | |
| -0.60365 | 7 | 45.4 | | |
| -0.59945 | 8 | 45.8 | | |
| -0.59525 | 9 | 45.3 | | |
| -0.59105 | 10 | 45.7 | | |
| -0.58685 | 11 | 45.2 | | |
| -0.58237 | 12 | 45.0 | | |
| -0.57817 | 13 | 45.1 | | |
| -0.57397 | 14 | 45.1 | | |
| -0.56977 | 15 | 45.0 | | |
| -0.56557 | 16 | 45.3 | | |
| -0.56137 | 17 | 45.2 | | |
| -0.55689 | 18 | 45.4 | | |
| -0.55269 | 19 | 45.8 | | |
| -0.54849 | 20 | 45.2 | | |
| -0.54429 | 21 | 45.2 | | |
| -0.54009 | 22 | 45.6 | | |
| -0.53561 | 23 | 45.2 | | |

| | Instructions for Inputting Data |
|---|---|
| 1 | Import Data from processed text file |
| 2 | Start import at Row 2 |
| 3 | Select "Comma" Delimited |
| 4 | Leave cell formatting "General" |
| 5 | Before Inserting Data, Click on "Properties" |
| 6 | Deselect "Save Query Definition" |
| 7 | Select "Overwrite Existing Cells, delete Unused Cells" |
| 8 | Import Data to Cell A2, and fill in Cells for 'Adjusted Time' and 'Row Number' |
| 9 | Enter the Row Number corresponding to the Seating Load, Initial, and Begin of Swell |
| 10 | Use Graphs for reference when selecting row numbers |

| | Enter Row # | Time (hr) | S1 (cm) | S2 (cm) | S3 (cm) | S4 (cm) | S5 (cm) | S6 (cm) |
|---|---|---|---|---|---|---|---|---|
| Seating: | 5 | 0.06 | 0.76 | 0.68 | 1.14 | 0.74 | 1.24 | 1.37 |
| Initial: | 146 | 0.66 | 0.75 | 0.68 | 1.13 | 0.74 | 1.23 | 1.37 |
| Begin of Swell : | 148 | 0.67 | | | | | | |

| | | S1 (g's) | S2 (g's) | S3 (g's) | S4 (g's) | S5 (g's) | S6 (g's) |
|---|---|---|---|---|---|---|---|
| Target G - Level: | 50.00 | | | | | | |
| Actual G - Level: | 45.84 | 45.96 | 45.50 | 45.60 | 45.98 | 45.59 | 45.71 |

| | | Values to Plot for Visual Checks | | | |
|---|---|---|---|---|---|
| # Rows in Record | 1618 | 44.80 | -0.61 | 1.37 | -0.01 |
| | | 25.18 | -0.61 | 0.00 | -0.01 |

*Figure 13 Data Input Sheet*

4. Choose seating time, initial time, and start time for the test.
   a) Seating time should correspond to the time just after increasing to the target g-level.
   b) Initial time should correspond to the end of the compression load, just before the water is added.
   c) Start time should correspond to the time that water is added to the samples. This may be chosen to match the "initial time", but easiest to choose times by inspecting the time-deflection plots.

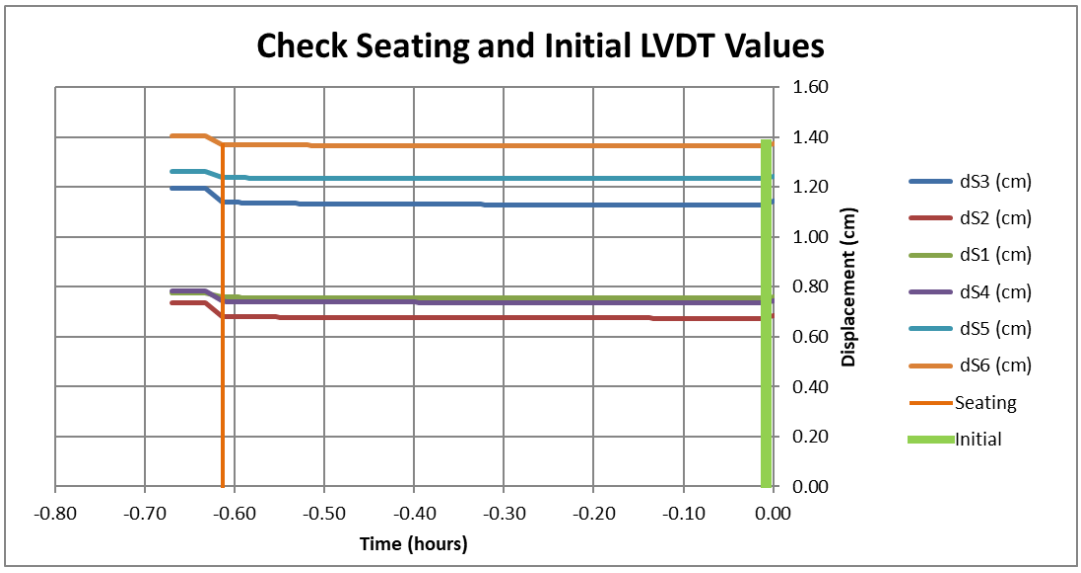



*Figure 14 Determining seating and initial height values*

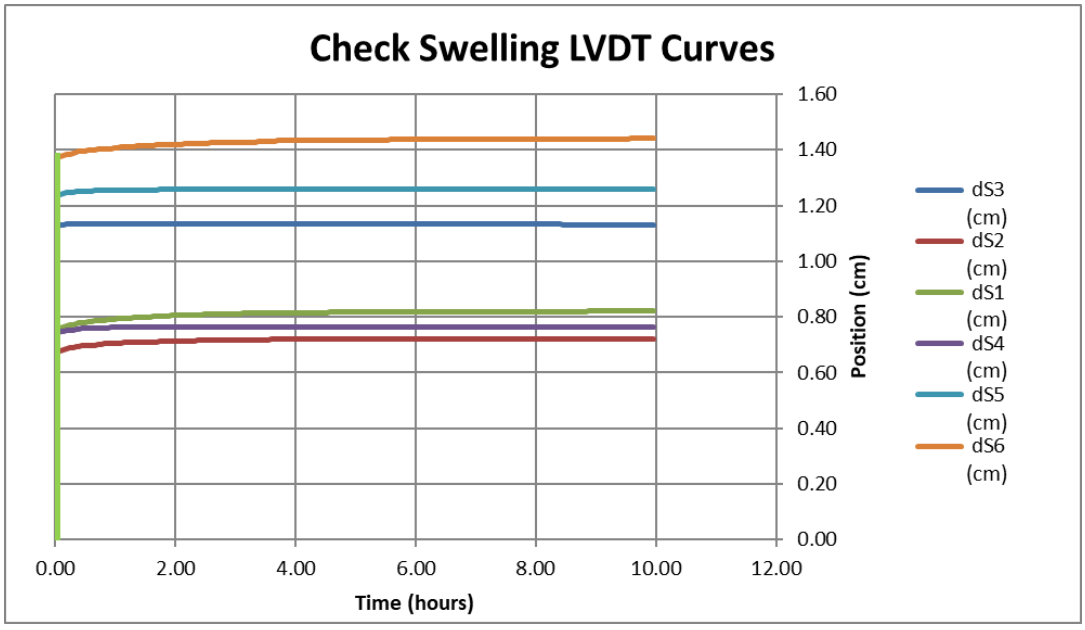



*Figure 15 Example Swell Time Curve*

5. For each sample, choose 2 points along primary swell curve and 2 points along secondary swell curve to obtain time and swell at end of primary. This

will correspond to swelling used in analysis. Choose one point from rebound as end of test.

| | Row # | Time (Hr) | Sample Height (cm) | Swelling | ω (rad/sec) | Slope (log) | Intercept |
|---|---|---|---|---|---|---|---|
| *Primary* | 70 | 0.13 | 0.650 | 2.02% | 42 | 3.08% | 0.048 |
| | 500 | 8.19 | 0.685 | 7.57% | 44 | | |
| *Secondary* | 520 | 8.56 | 0.686 | 7.60% | 44 | 1.00% | 0.067 |
| | 700 | 14.57 | 0.687 | 7.83% | 44 | | |
| *End of Test* | 1197 | 41.06 | 0.822 | 28.98% | 42 | | |
| *Last Record* | 1197 | 41.06 | 0.822 | 28.98% | 42 | | |

1 Last recorded value is used in phase calculations for the sample
2 End of test refers to the last reading before centrifuge is spun down

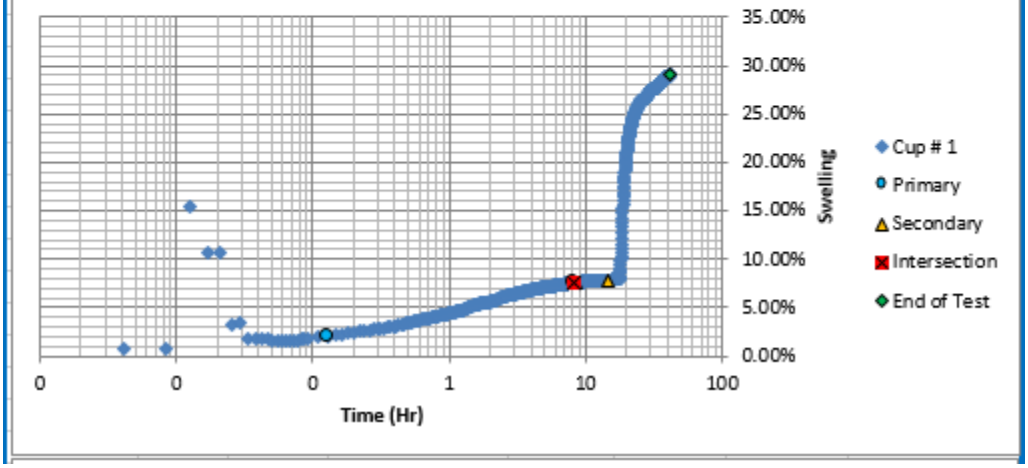



*Figure 16 Determination of end of primary, secondary and ultimate swell*

6. Repeat for each depth in separate analysis spreadsheets.

### 3.3.4 Stresses and g-levels

The tests were run at certain g levels representing the stresses at the respective depths which are described in the table below:

*Table 1 Stresses and g-levels.*

| Depth (ft) | G Level | Low Stress (Psf) | Medium Stress (Psf) | High Stress (Psf) |
|---|---|---|---|---|
| 0-2' | 25 | 168 | 240 | 394 |
| 2-4' | 35 | 236 | 337 | 552 |
| 4-6' | 50 | 337 | 481 | 788 |
| 6-8' | 65 | 438 | 625 | 1025 |
| 8-10' | 80 | 538 | 769 | 1262 |

# Chapter 4: Site Classification of Farm to Market Road 2

## 4.1 LOCATION

The Farm to Market road 2 is located in the Grimes County, near the city of Navasota, approximately 124 miles from Austin. 16 boring points were selected on a stretch of 2.6 miles of the road. The boring locations were picked from different sections of the road that were either reinforced with geosynthetics, lime stabilized or left untouched. The boring locations are shown below:

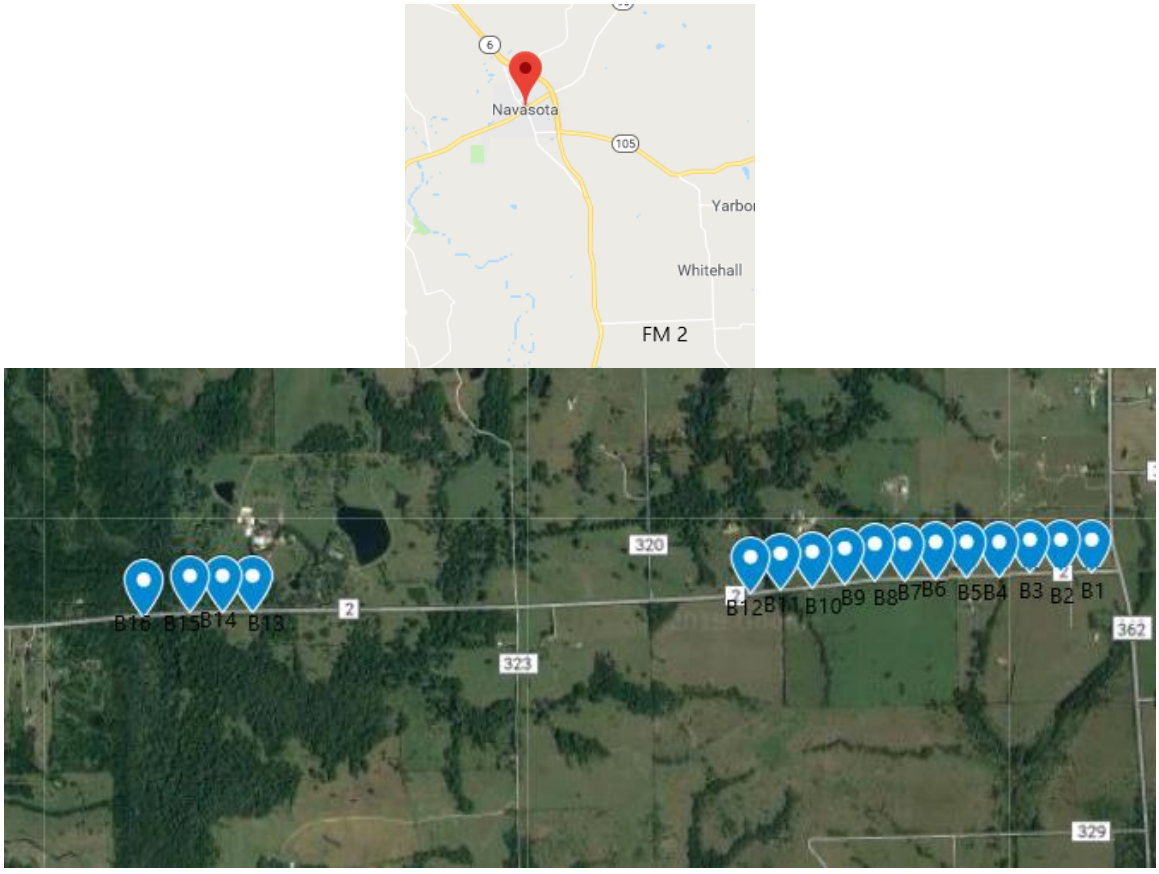



*Figure 17 Site location FM2.*

# Chapter 5: Data Analysis and Test Results

From each boring, representative depths were selected by visually analyzing the soil texture and type. The analysis is shown below in Section 5.1.

## 5.1 Initial Characterization

This section includes data values like initial moisture content, density, Atterberg Limits, TxDOT dry condition, and total suction as given below.

*Table 2 Boring 1.*

| **Boring 1** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 24% | 96.63 | 54 | 26 | 29 | 19.8 | 0.77 |
| 2-4' | 23% | 98.87 | 62 | 21 | 41 | 21.4 | 0.98 |
| 4-6' | 27% | 95.95 | 82 | 24 | 58 | 25.4 | 1.18 |
| 6-8' | 29% | 95.3 | 90 | 25 | 65 | 27 | 1.25 |
| 8-10' | 28% | 99.08 | 95 | 27 | 68 | 28 | 1.65 |

*Table 3 Boring 2.*

| **Boring 2** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 21% | 102.99 | 50 | 19 | 31 | 19 | 0.47 |
| 4-6' | 23% | 101.04 | 68 | 14 | 54 | 22.6 | 1.1 |
| 8-10' | 28% | 96.96 | 100 | 22 | 79 | 29 | 1.56 |

*Table 4 Boring 3.*

| Boring 3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 19% | 101.18 | 68 | 20 | 54 | 22.6 | 2.08 |
| 4-6' | 28% | 89.69 | 88 | 24 | 66 | 26.6 | 1.02 |
| 8-10' | 31% | 89.92 | 94 | 32 | 62 | 27.8 | 0.88 |

*Table 5 Boring 4.*

| Boring 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 0.227004 | 85.11691 | 71 | 24 | 47 | 23.2 | 1.4 |
| 6-8' | 0.223 | 97.73 | 71 | 15 | 55 | 23.2 | 0.82 |
| 8-10' | 0.27462 | 98.36146 | 98 | 24 | 75 | 28.6 | 0.85 |

*Table 6 Boring 5.*

| Boring 5 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 21% | 110.41 | 62 | 21 | 41 | 21.4 | 0.81 |
| 2-4' | 29% | 90.33 | 65 | 23 | 41 | 22 | 0.63 |
| 4-6' | 26% | 95.65 | 66 | 23 | 43 | 22.2 | 0.55 |
| 6-8' | 26% | 94.66 | 68 | 21 | 47 | 22.6 | 0.61 |
| 8-10' | 8% | 117.37 | 40 | 14 | 27 | 17 | 0.54 |

*Table 7 Boring 6.*

| Boring 6 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 29% | 89.16 | 73 | 23 | 50 | 23.6 | 0.52 |
| 4-6' | 34% | 83.68 | 92 | 22 | 70 | 27.4 | 0.7 |
| 8-10' | 28% | 93.77 | 88 | 21 | 67 | 26.6 | 0.84 |

*Table 8 Boring 7.*

| Boring 7 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 19% | 106.33 | 49 | 18 | 31 | 18.8 | 0.68 |
| 2-4' | 29% | 89.83 | 71 | 24 | 47 | 23.2 | 0.75 |
| 4-6' | 29% | 90.87 | 87 | 23 | 64 | 26.4 | 0.69 |
| 6-8' | 30% | 88.77 | 88 | 24 | 65 | 26.6 | 0.65 |
| 8-10' | 34% | 88.98 | 96 | 27 | 70 | 28.2 | 0.83 |

*Table 9 Boring 8.*

| Boring 8 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 23% | 93.41 | 82 | 22 | 58 | 25.4 | 2.34 |
| 4-6' | 27% | 94.18 | 94 | 23 | 69 | 27.8 | 1.7 |
| 8-10' | 30% | 89.71 | 86 | 29 | 57 | 26.2 | 0.91 |

*Table 10 Boring 9.*

| Boring 9 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 26% | 95.45 | 61 | 19 | 42 | 21.2 | 1.95 |
| 4-6' | 19% | 102.59 | 66 | 16 | 50 | 22.2 | 1.03 |

*Table 11 Boring 10.*

| Boring 10 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 19% | 105.69 | 52 | 18 | 33 | 19.4 | 1.47 |

*Table 12 Boring 11.*

| Boring 11 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 16% | 95.89 | 50 | 14 | 37 | 19 | 1.77 |
| 4-6' | 18% | 99.38 | 38 | 11 | 27 | 24.2 | 1.99 |
| 8-10' | 14% | 109.29 | 30 | 17 | 13 | 12.4 | 0.53 |

*Table 13 Boring 12.*

| Boring 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 15% | 107.36 | 56 | 16 | 41 | 20.2 | 2.82 |
| 4-6' | 21% | 95.96 | 69 | 17 | 51 | 22.8 | 1.2 |
| 8-10' | 12% | 115.08 | 53 | 14 | 38 | 19.6 | 0.44 |

*Table 14 Boring 13*

| Boring 13 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 13% | 104.66 | 24 | 16 | 8 | 13.8 | 1.3 |
| 4-6' | 10% | 109.00 | 29 | 17 | 11 | 14.8 | 0.93 |
| 8-10' | 9% | 107.04 | 22 | 13 | 9 | 13.4 | 0.52 |

*Table 15 Boring 15.*

| Boring 15 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 2-4' | 0.14 | 107.77 | 41 | 15 | 26 | 17.2 | 0.92 |
| 4-6' | 0.176 | - | 51 | 17 | 35 | 19.2 | 0.92 |

*Table 16 Boring 16.*

| Boring 16 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Depth (Ft)** | **Moisture Content (%)** | **Dry Density (Pcf)** | **LL (%)** | **PL (%)** | **PI (%)** | **TxDOT Dry (%)** | **Total Suction (Mpa)** |
| 0-2' | 22% | 98.23 | 59 | 18 | 41 | 20.8 | 0.6 |
| 2-4' | 25% | 98.54 | 67 | 18 | 50 | 22.4 | 0.6 |
| 4-6' | 28% | 92.27 | 74 | 20 | 54 | 23.8 | 0.5 |
| 8-10' | 31% | 84.96 | 83 | 23 | 60 | 25.6 | 0.42 |

## 5.3 Stress-Swell Data

### Boring 1

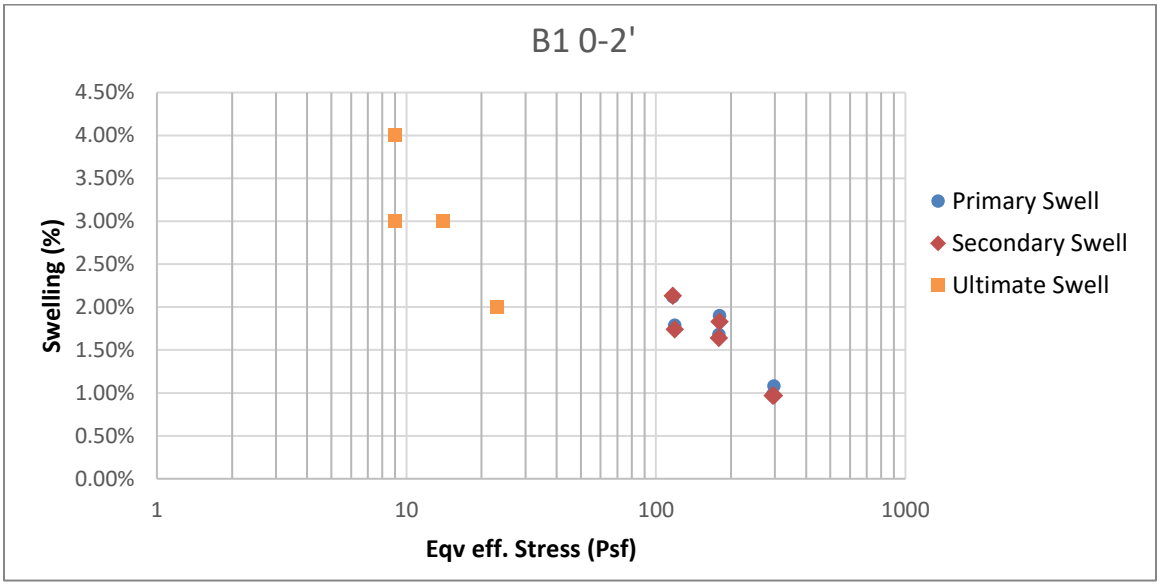



*Figure 18 Boring 1, 0-2 ft. depth.*

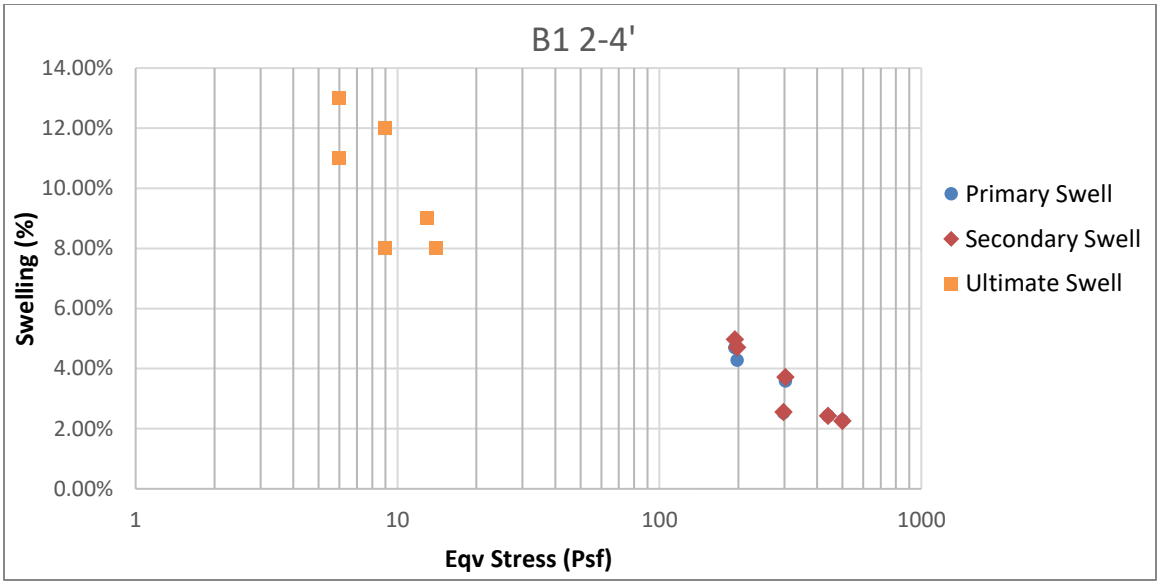



*Figure 19 Boring 1, 2-4 ft. depth.*

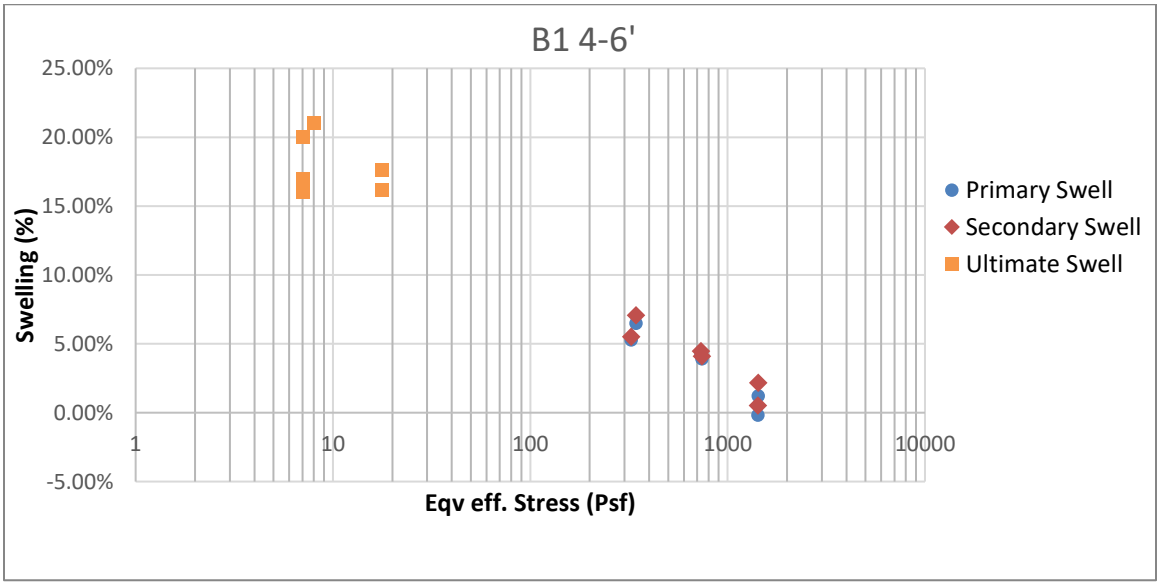



*Figure 20 Boring 1, 4-6 ft. depth.*

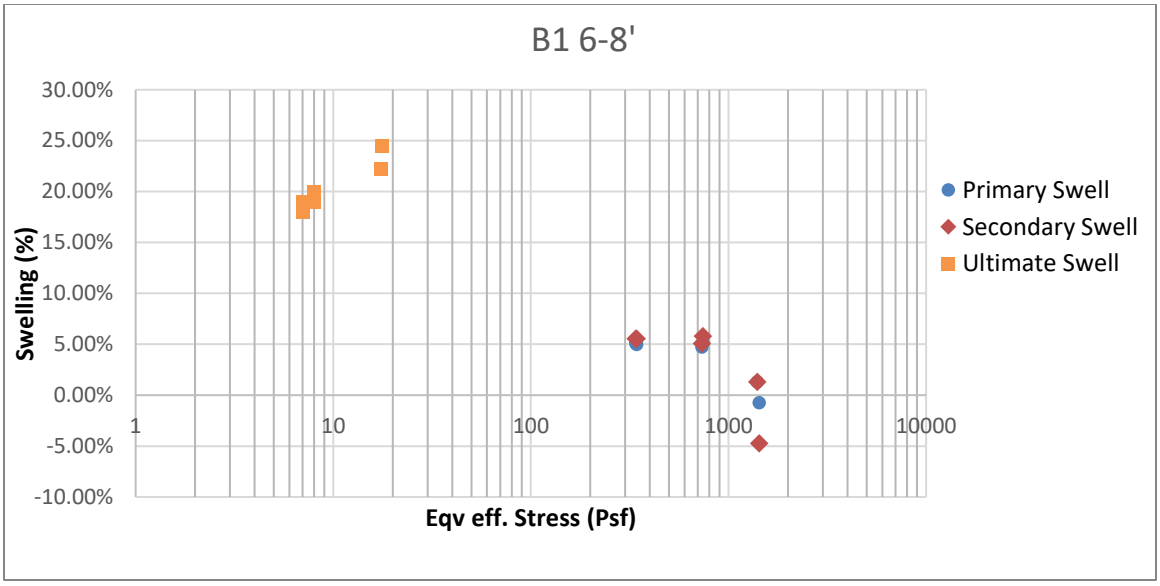



*Figure 21 Boring 1, 6-8 ft. depth.*

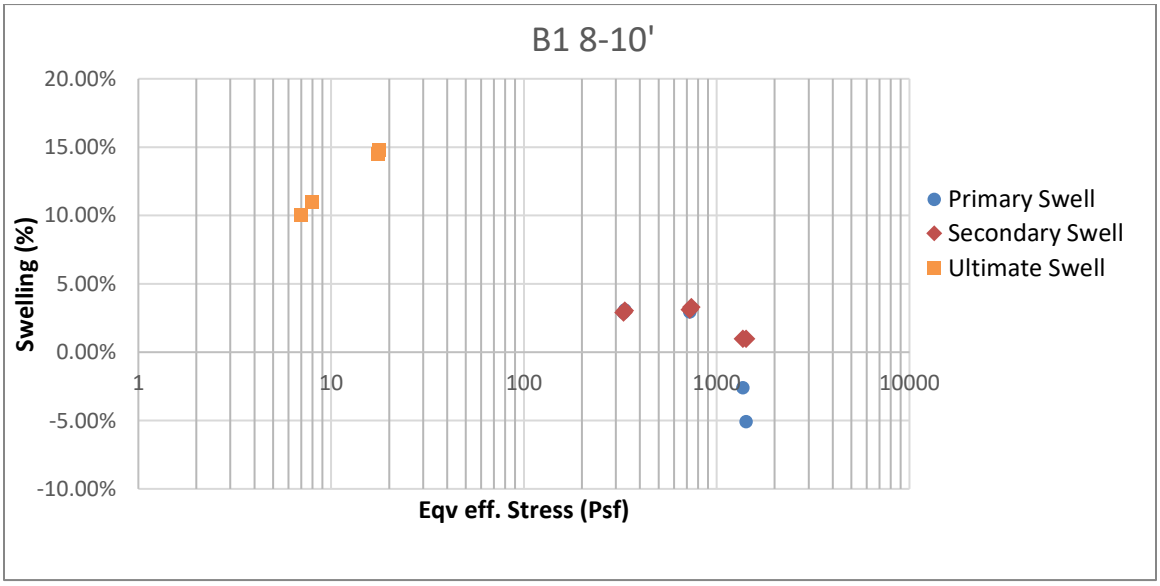



*Figure 22 Boring 1, 8-10 ft. depth.*

## Boring 2

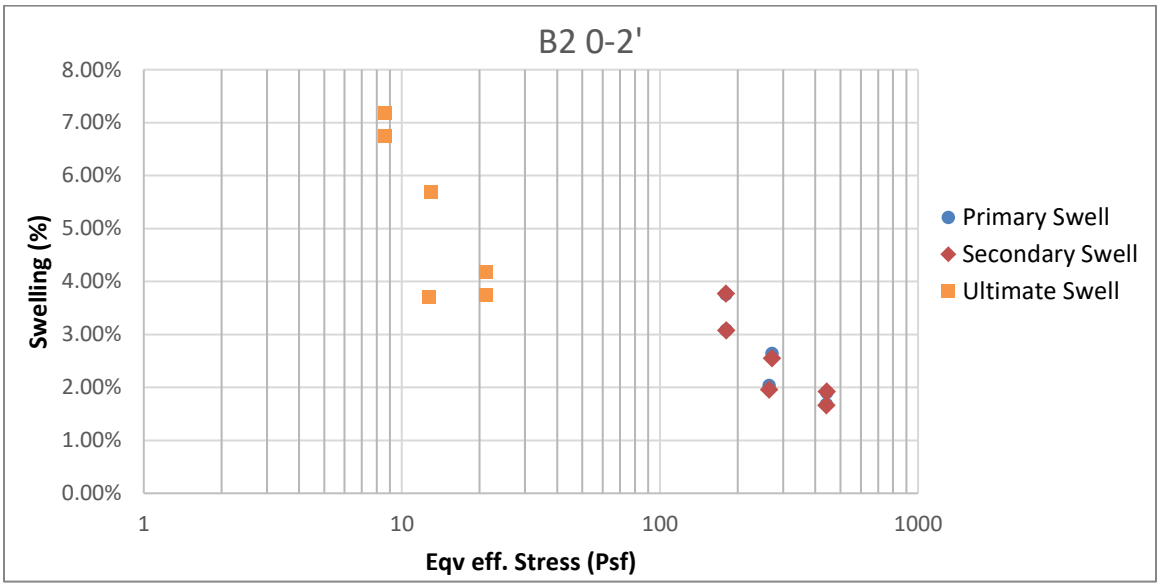



*Figure 23 Boring 2, 0-2 ft. depth.*

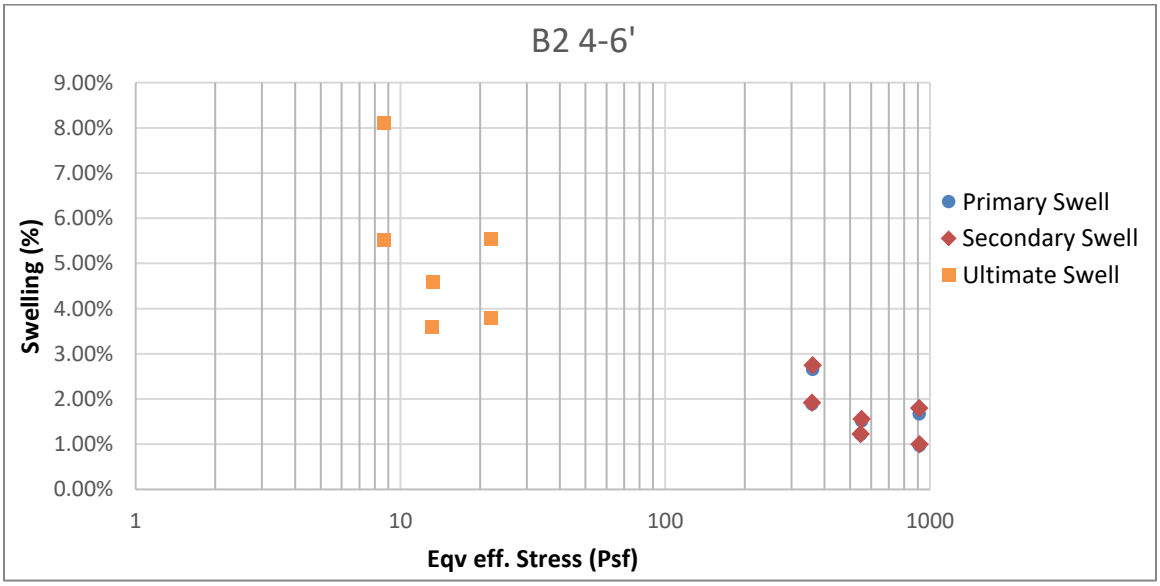



*Figure 24 Boring 2, 4-6 ft. depth.*

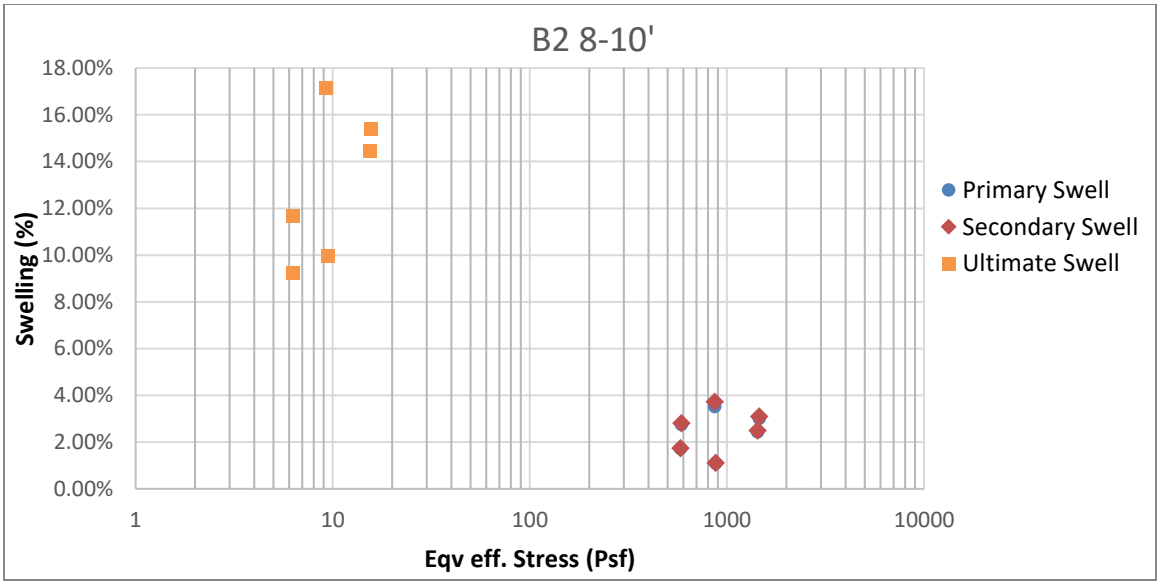



*Figure 25 Boring 2, 8-10 ft. depth.*

## Boring 3

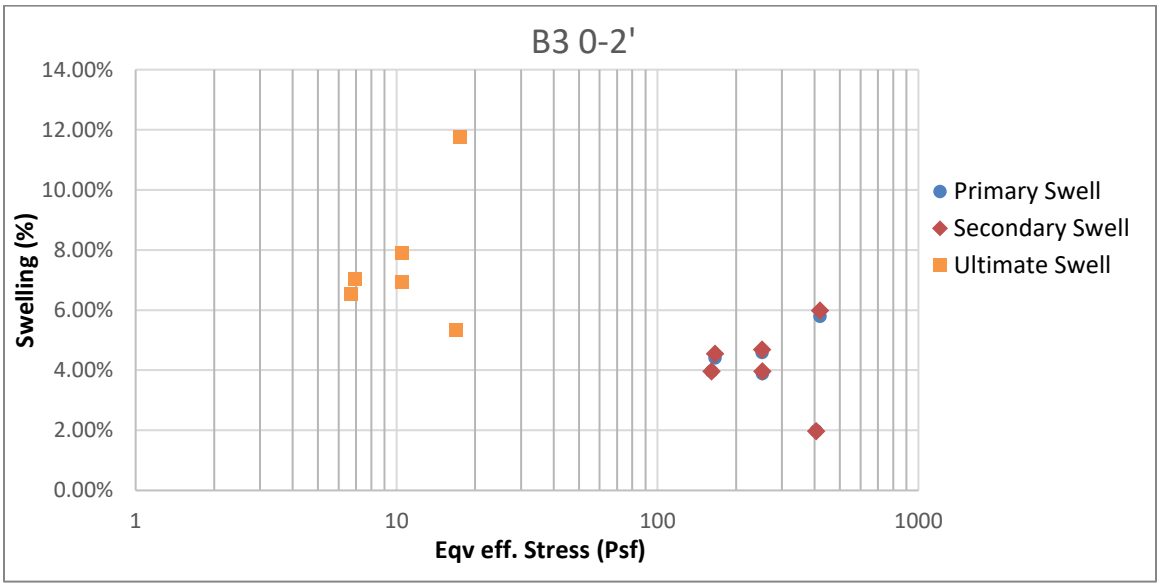



*Figure 26 Boring 3, 0-2 ft. depth.*

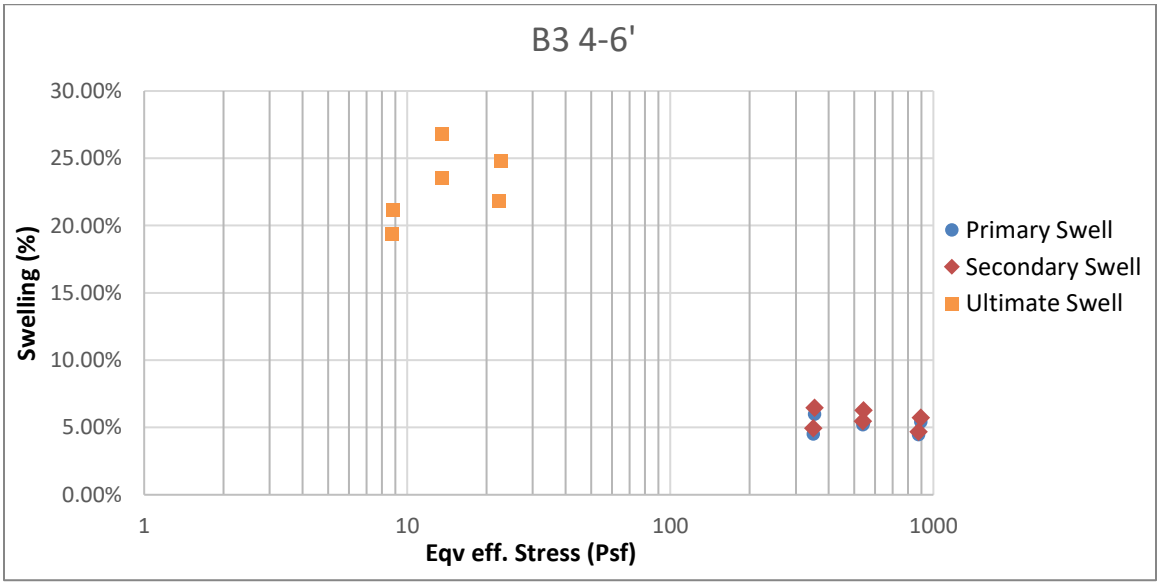



*Figure 27 Boring 3, 4-6 ft. depth.*

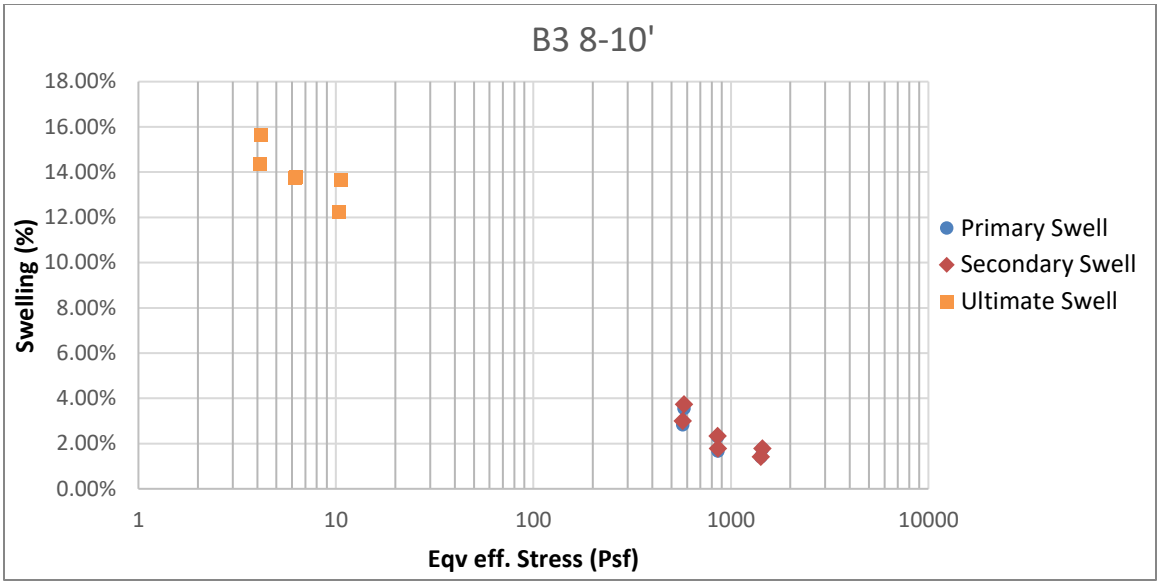



*Figure 28 Boring 3, 8-10 ft. depth.*

## Boring 4

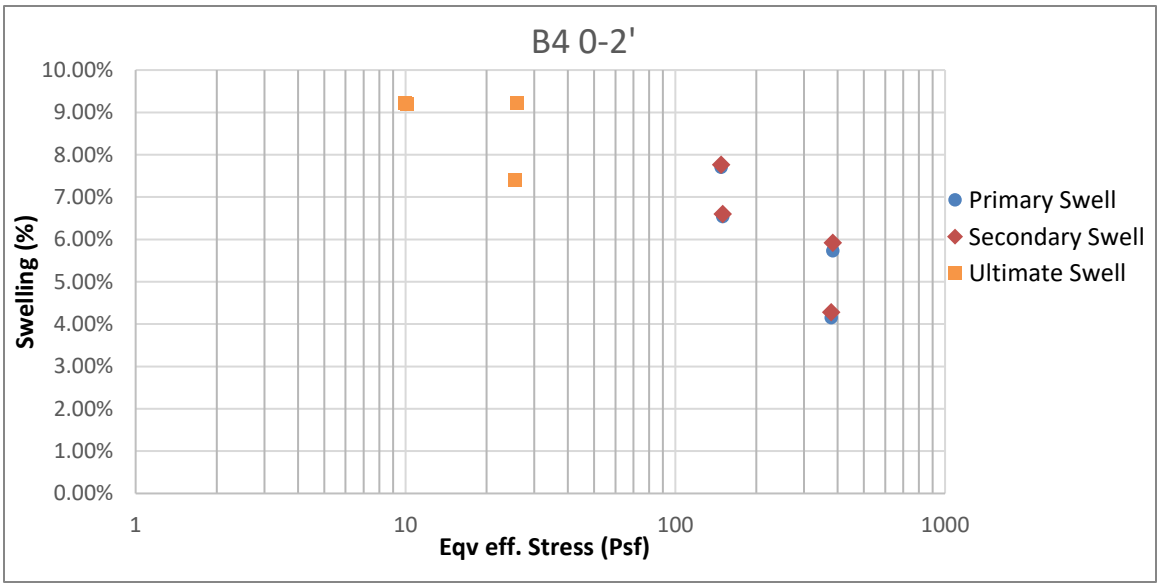



*Figure 29 Boring 4, 0-2 ft. depth.*

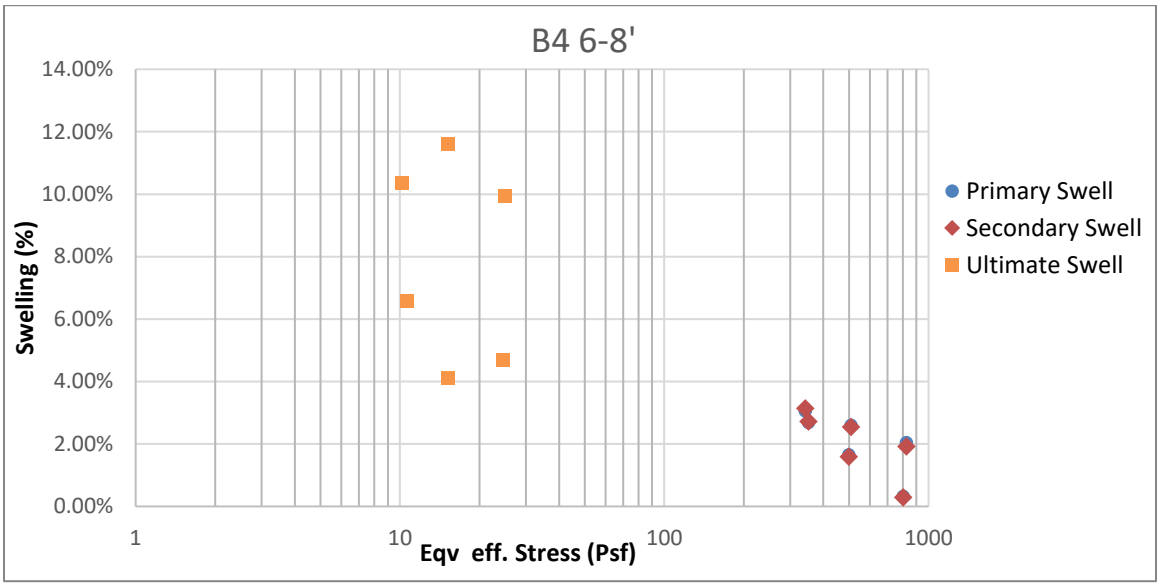



*Figure 30 Boring 4, 6-8 ft. depth.*

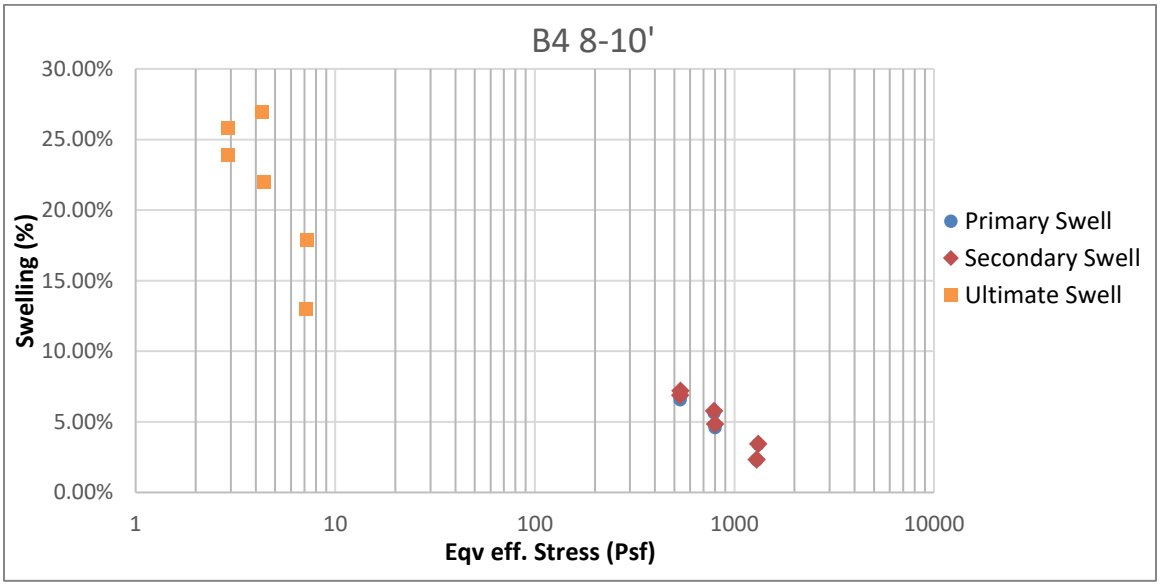



*Figure 31 Boring 4, 8-10 ft. depth.*

## Boring 5

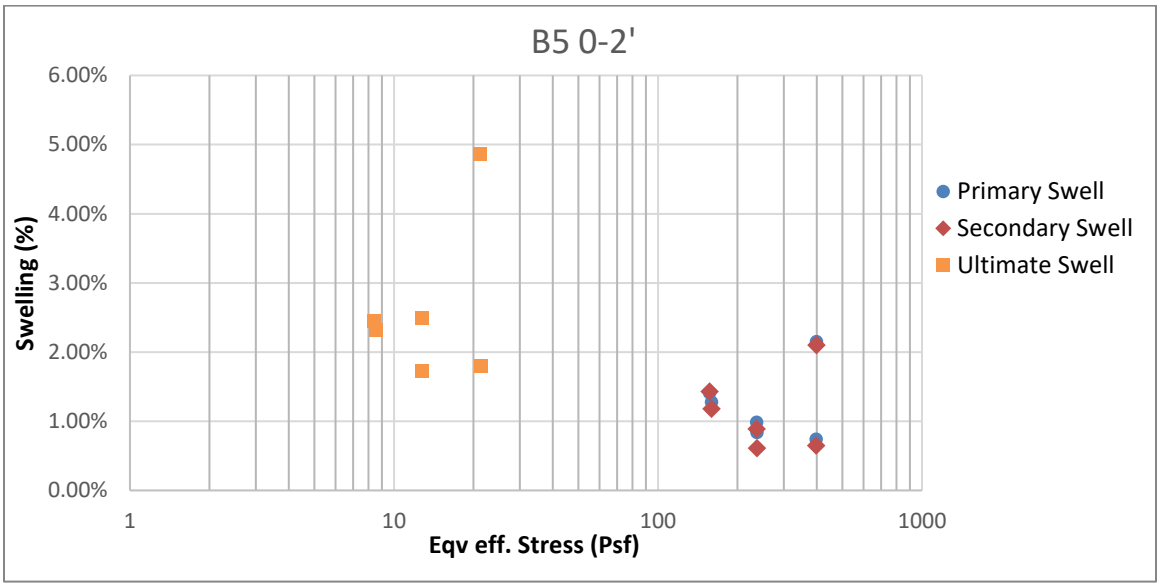



*Figure 32 Boring 5, 0-2 ft. depth.*

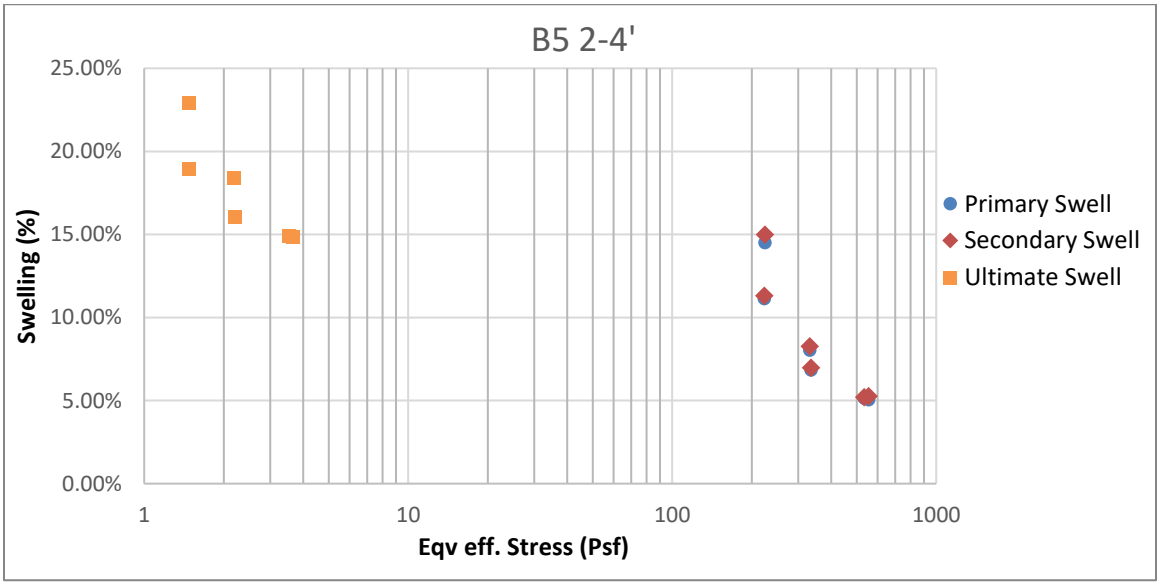



*Figure 33 Boring 5, 2-4 ft. depth.*

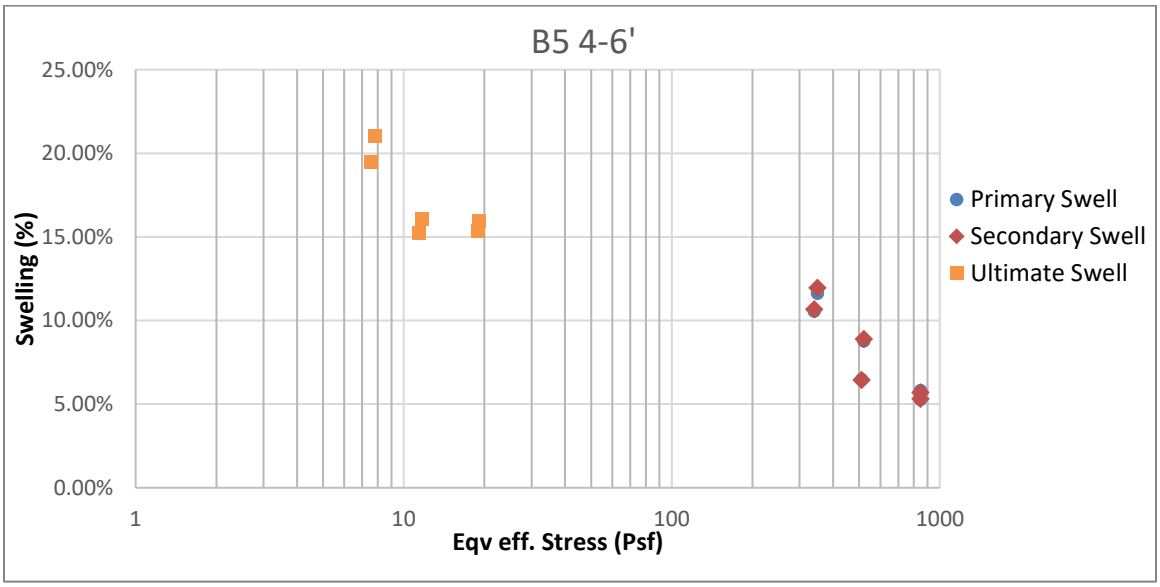



*Figure 34 Boring 5, 4-6 ft. depth.*

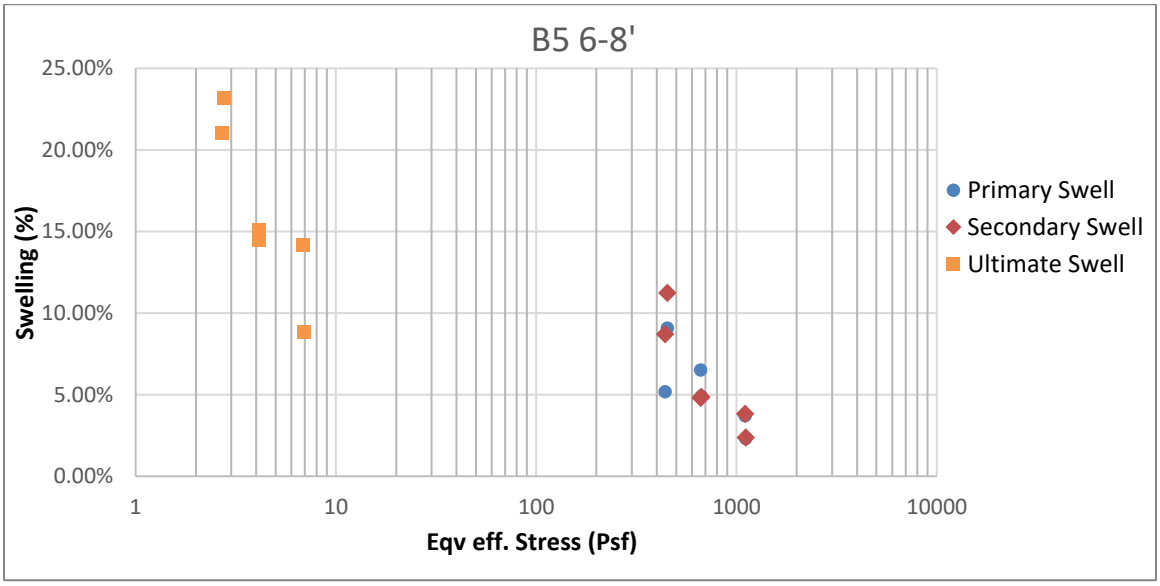



*Figure 35 Boring 5, 6-8 ft. depth.*

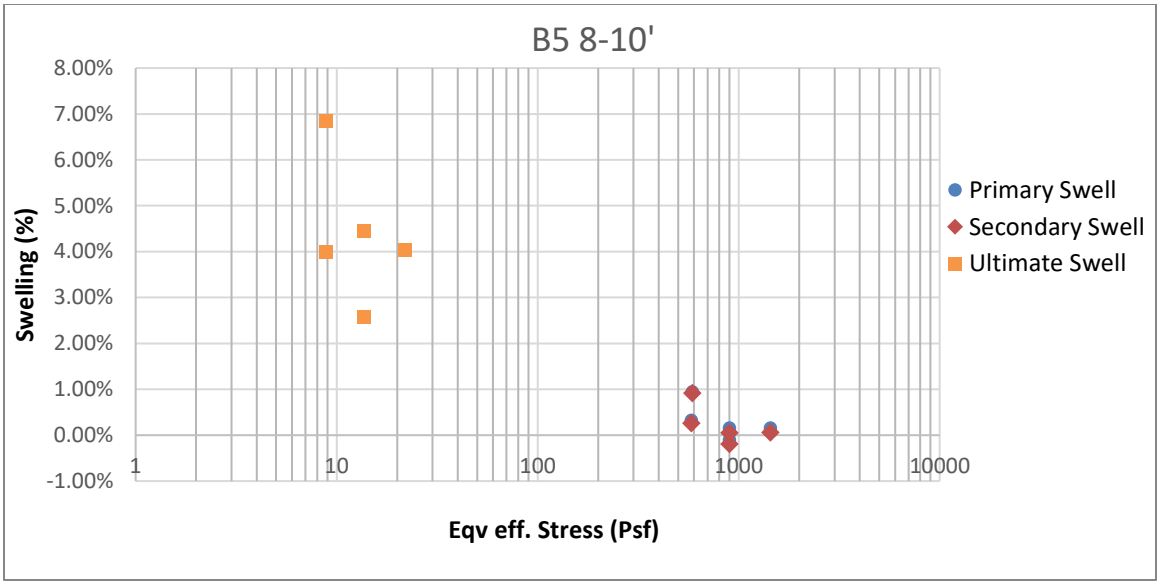



*Figure 36 Boring 5, 8-10 ft. depth.*

## Boring 6

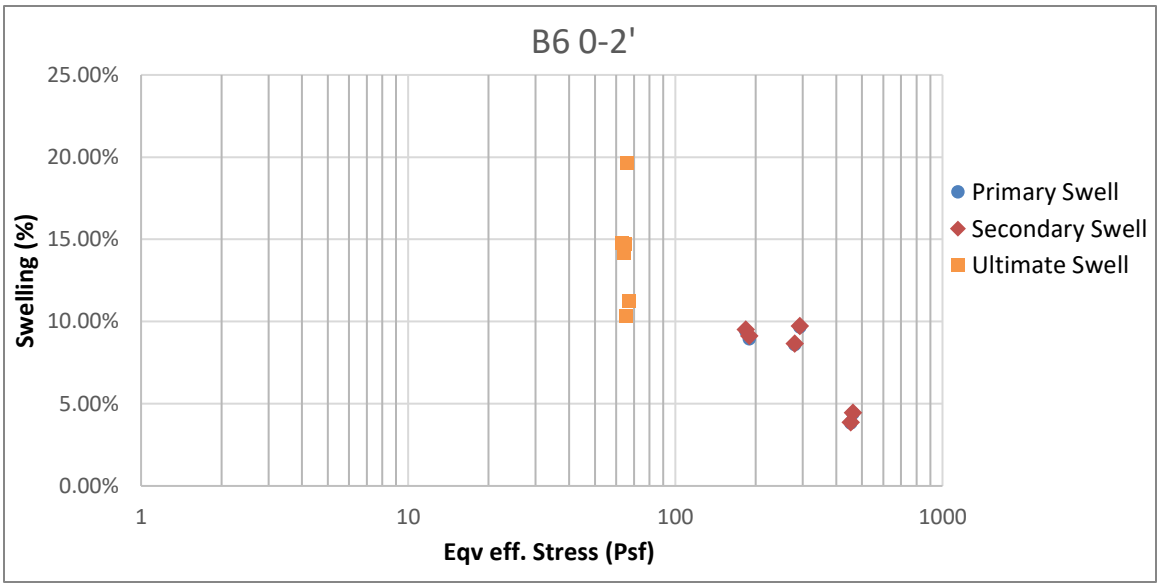



*Figure 37 Boring 6, 0-2 ft. depth.*

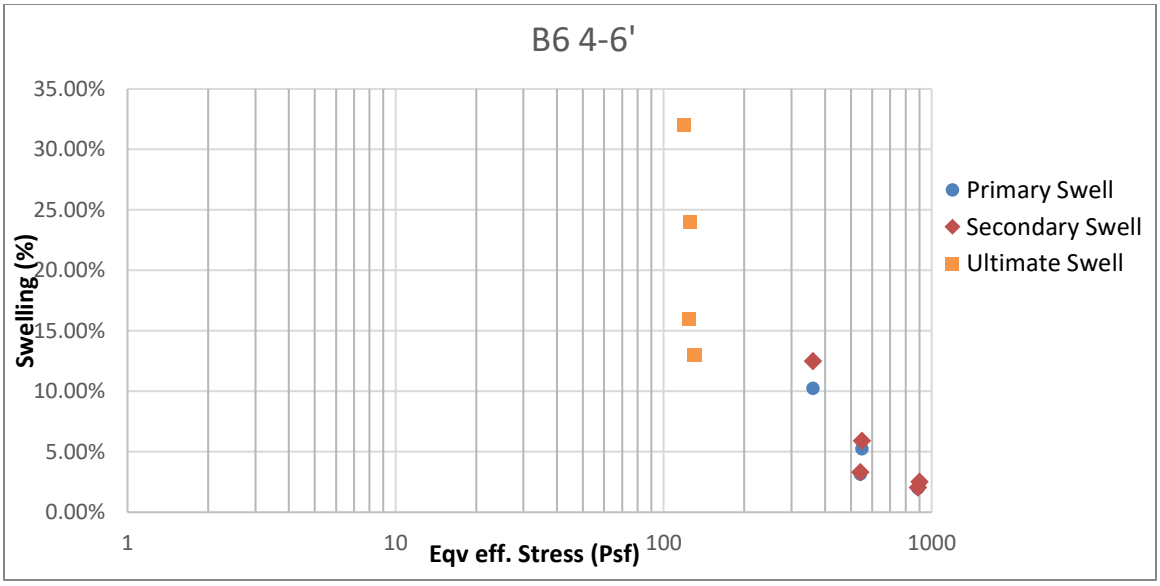



*Figure 38 Boring 6, 4-6 ft. depth.*

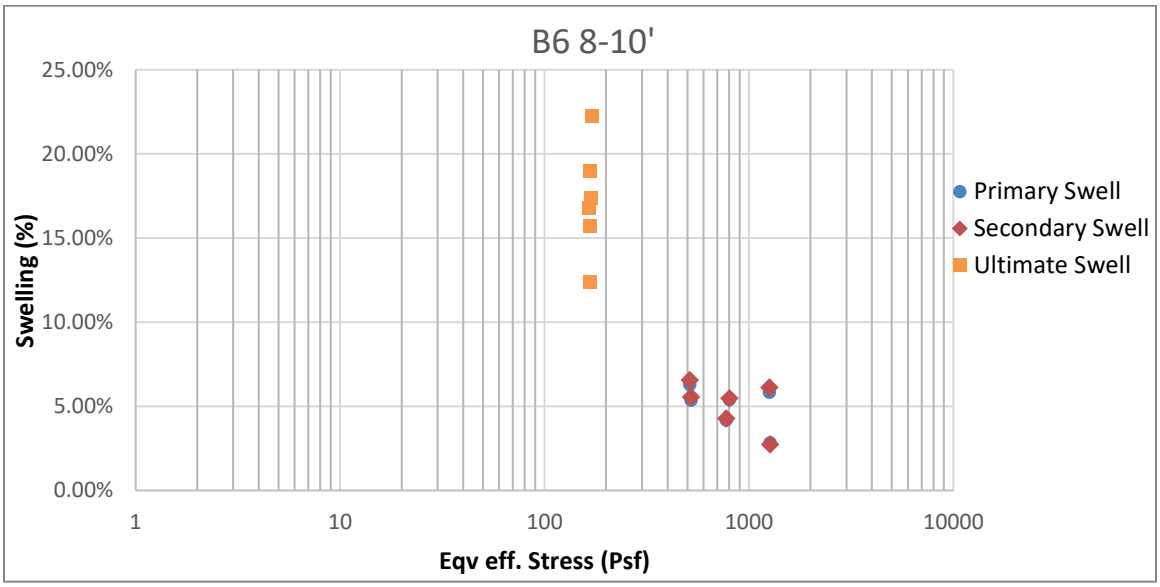



*Figure 39 Boring 6, 8-10 ft. depth.*

## Boring 7

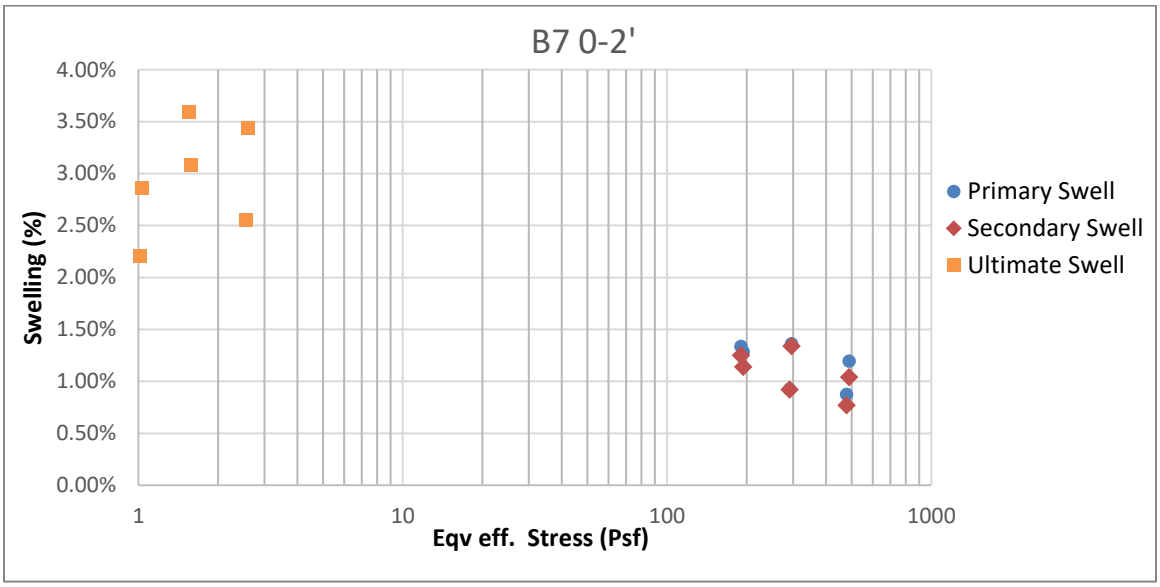



*Figure 40 Boring 7, 0-2 ft. depth.*

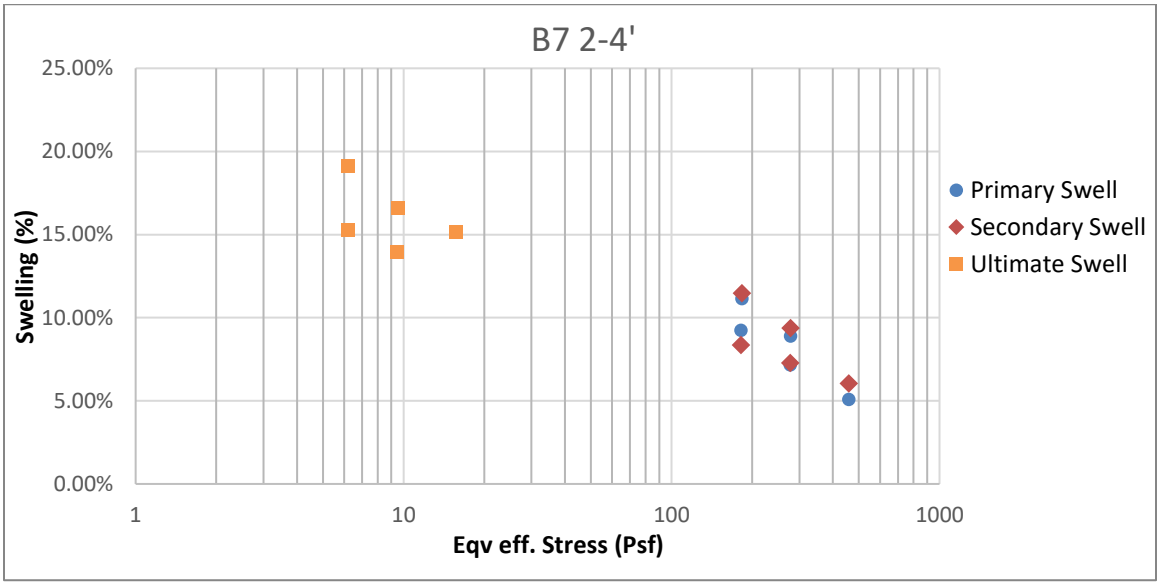



*Figure 41 Boring 7, 2-4 ft. depth.*

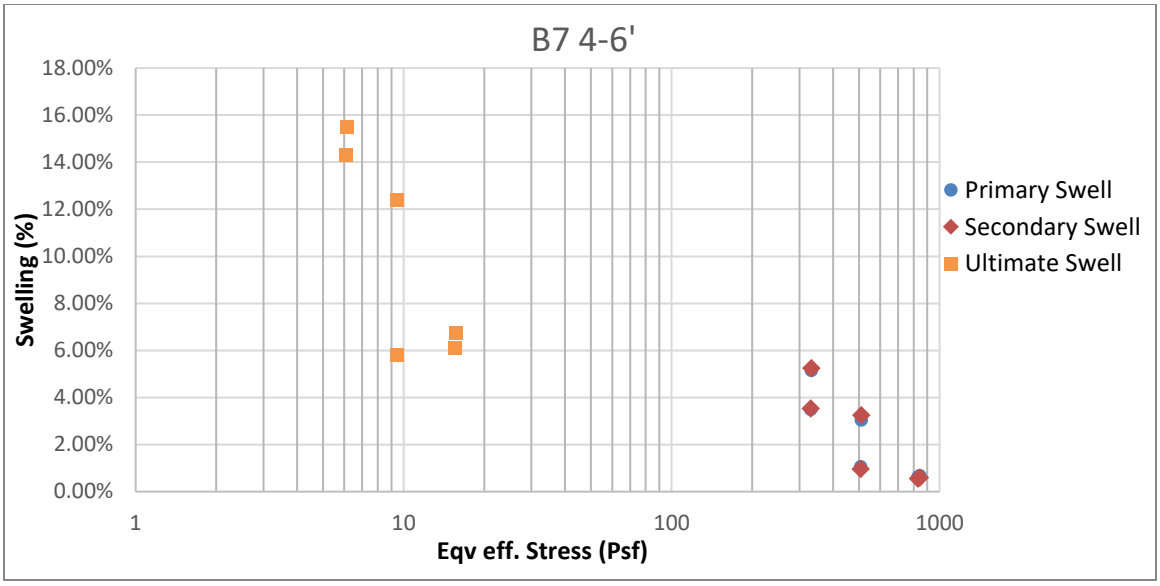



*Figure 42 Boring 7, 4-6 ft. depth.*

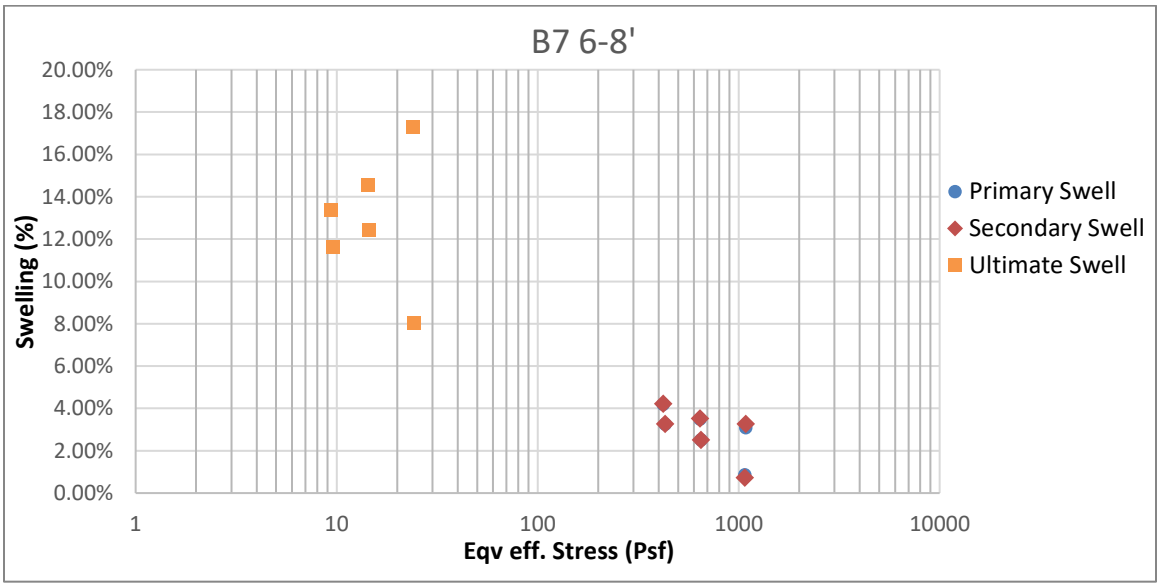



*Figure 43 Boring 7, 6-8 ft. depth.*

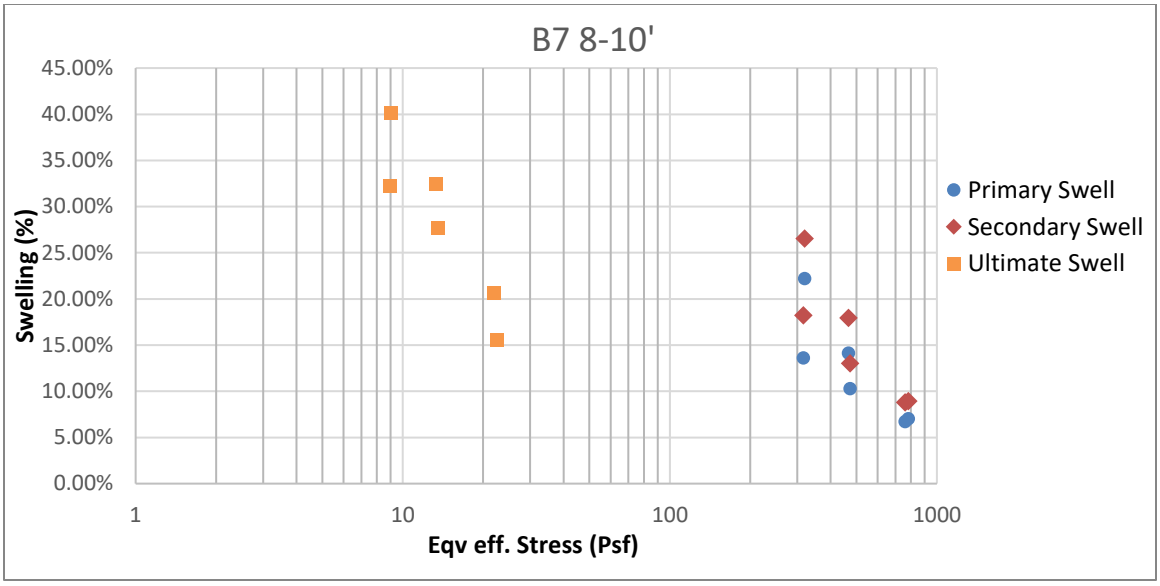



*Figure 44 Boring 7, 8-10 ft. depth.*

## Boring 8

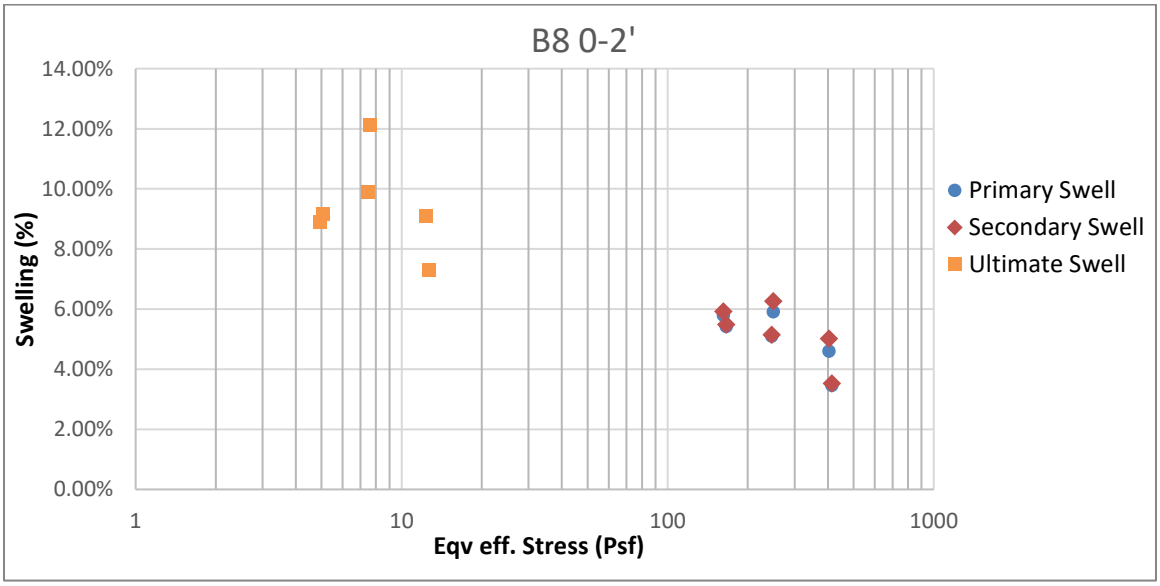



*Figure 45 Boring 8, 0-2 ft. depth.*

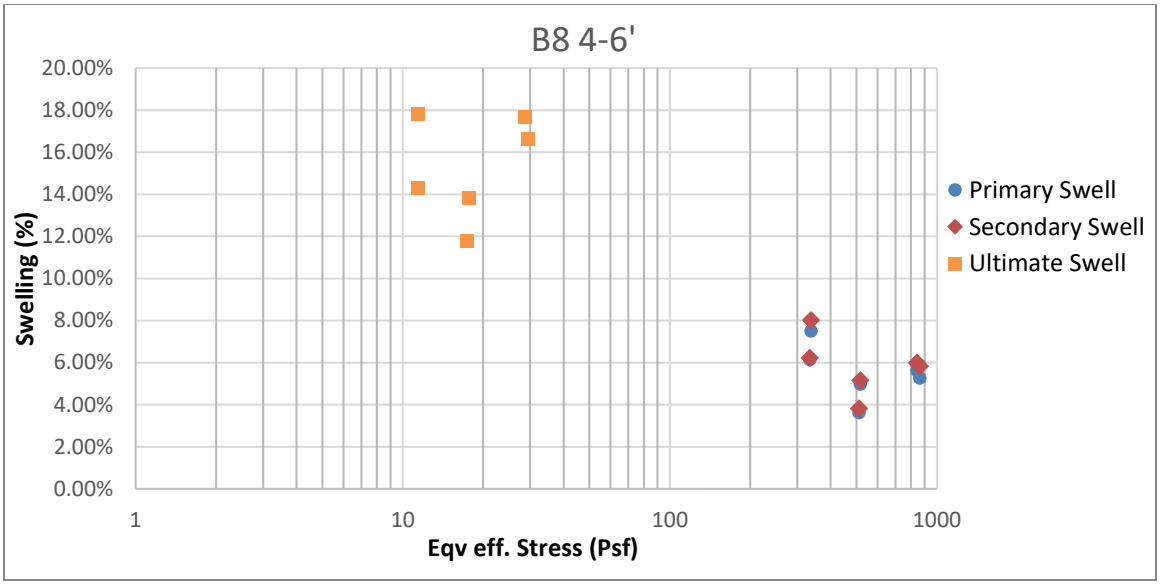



*Figure 46 Boring 8, 4-6 ft. depth.*

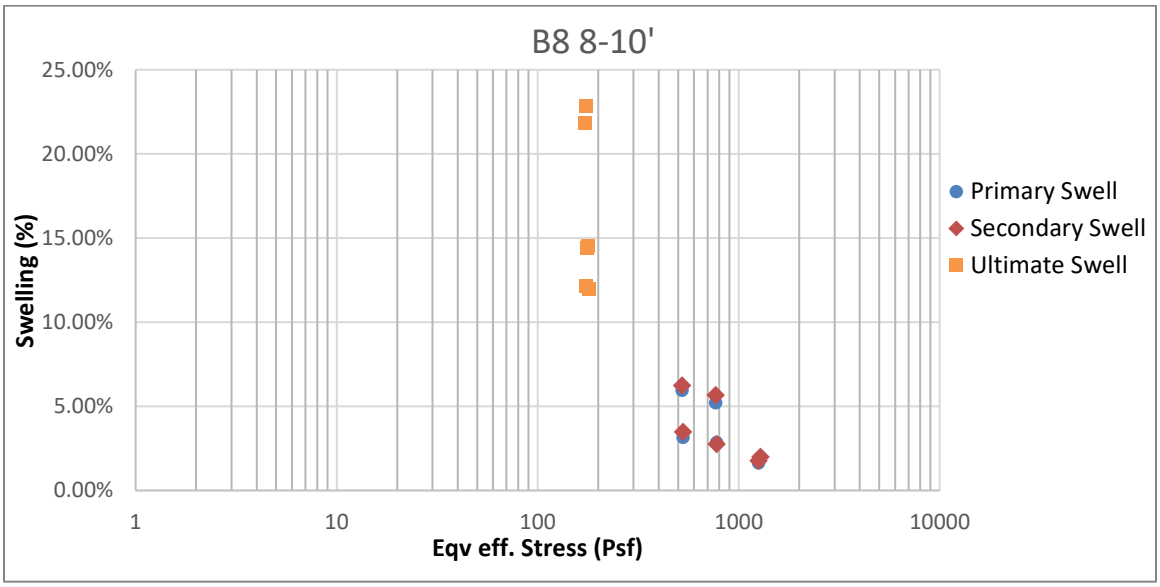



*Figure 47 Boring 8, 8-10 ft. depth.*

## Boring 9

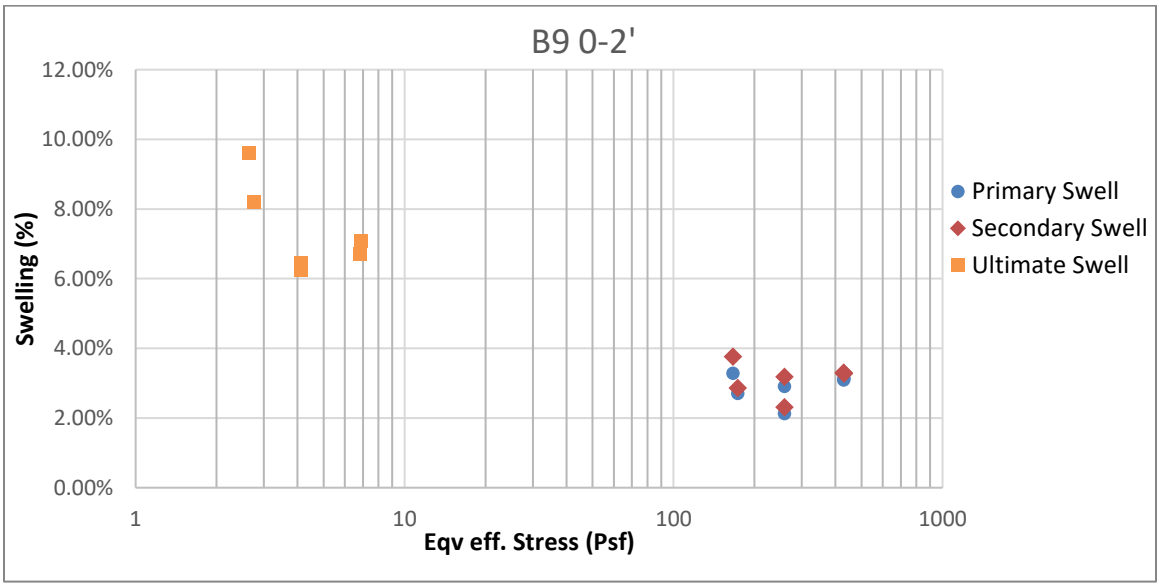



*Figure 48 Boring 9, 0-2 ft. depth.*

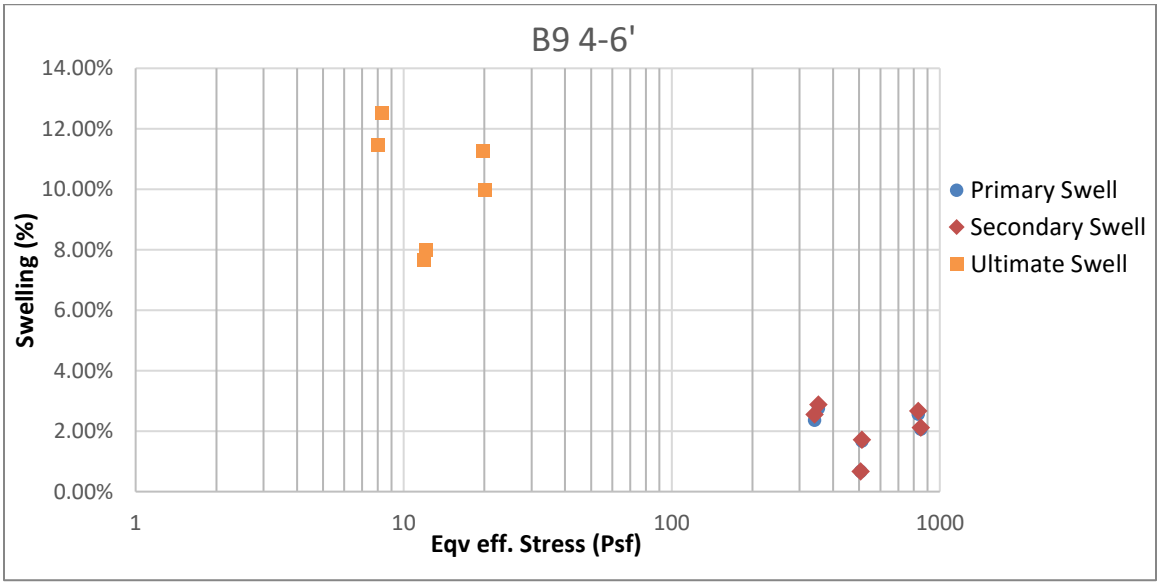



*Figure 49 Boring 9, 4-6 ft. depth.*

## Boring 10

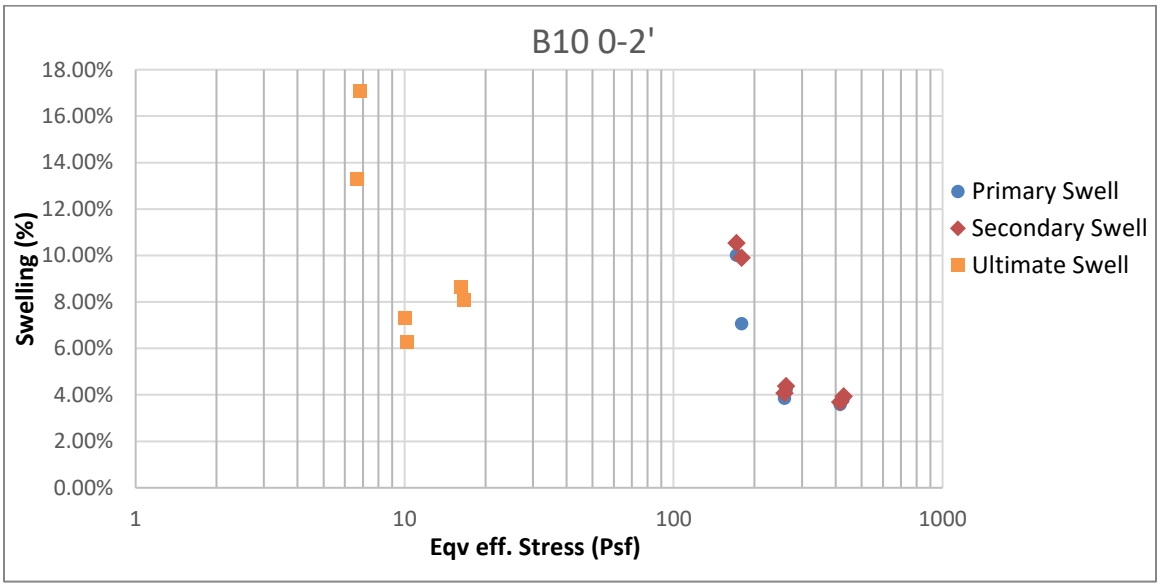



*Figure 50 Boring 10, 0-2 ft. depth.*

## Boring 11

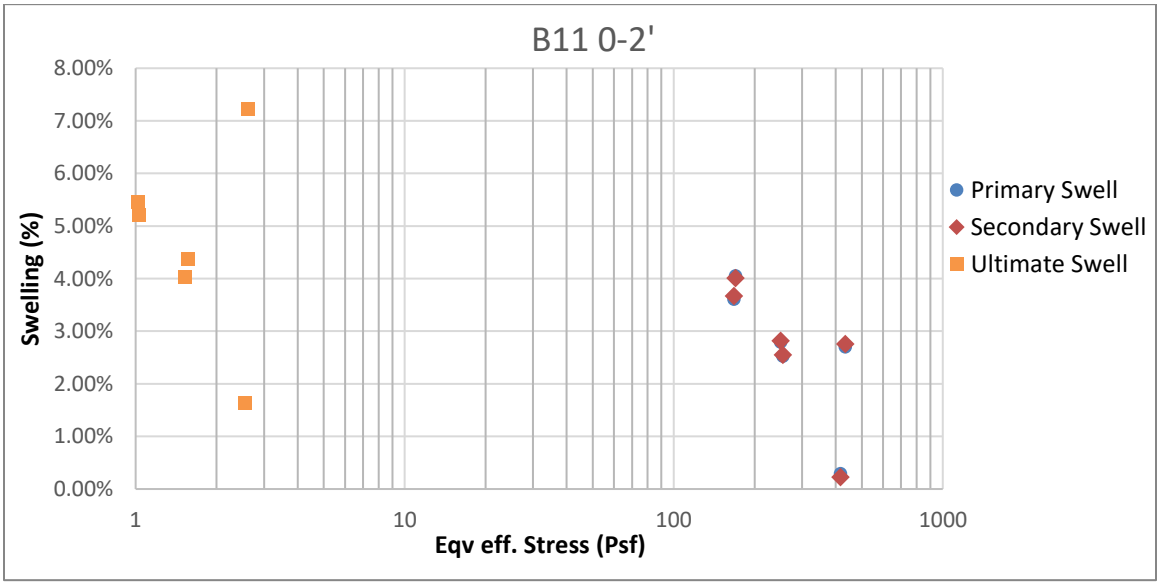



*Figure 51 Boring 11, 0-2 ft. depth.*

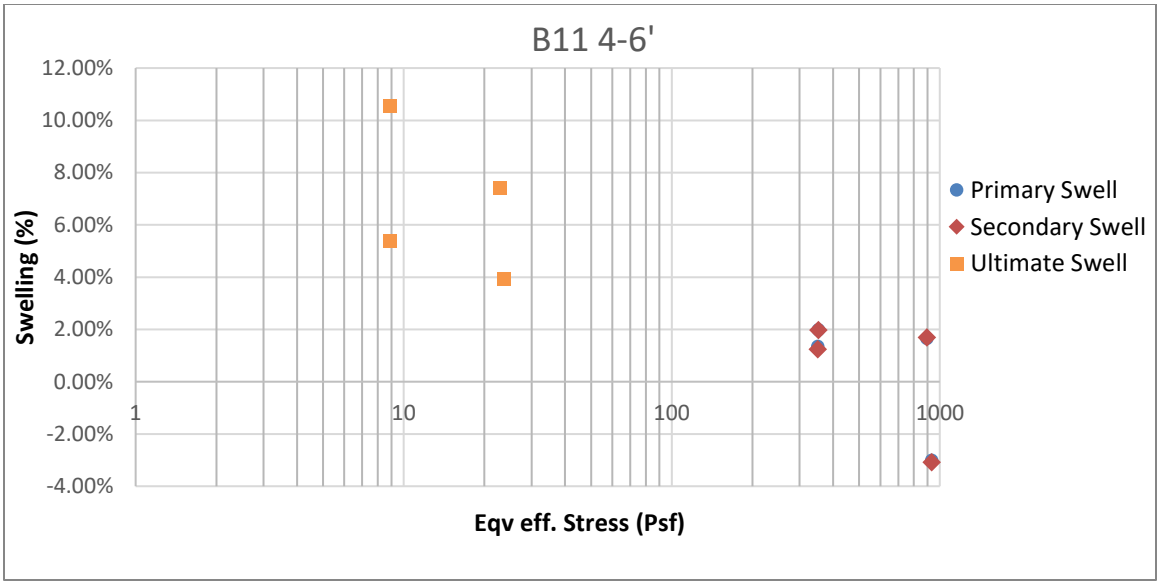



*Figure 52 Boring 11, 4-6 ft. depth.*

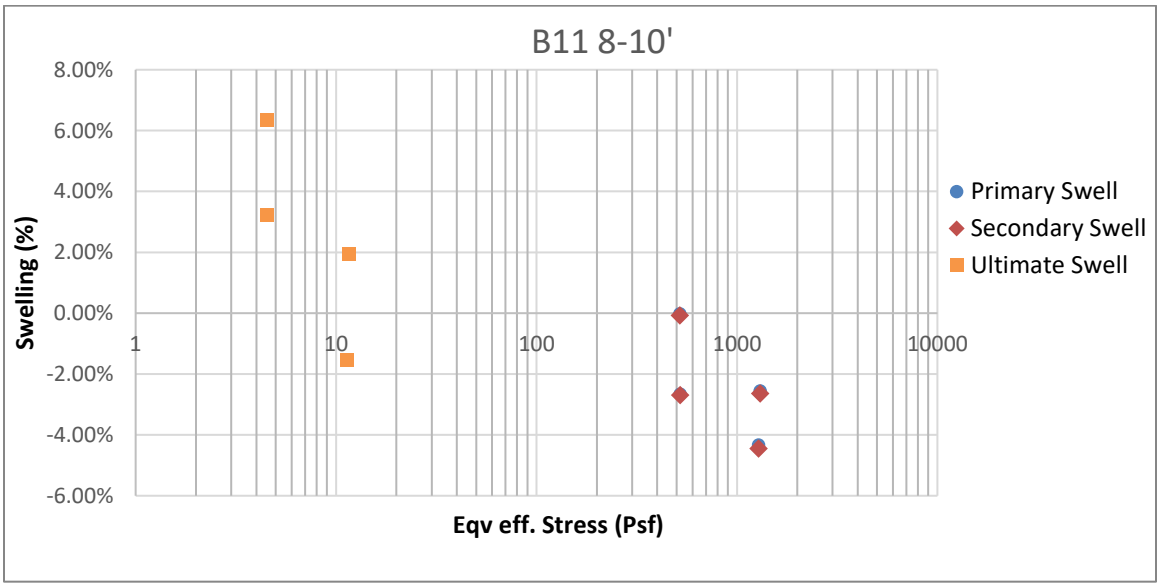



*Figure 53 Boring 11, 8-10 ft. depth.*

## Boring 12

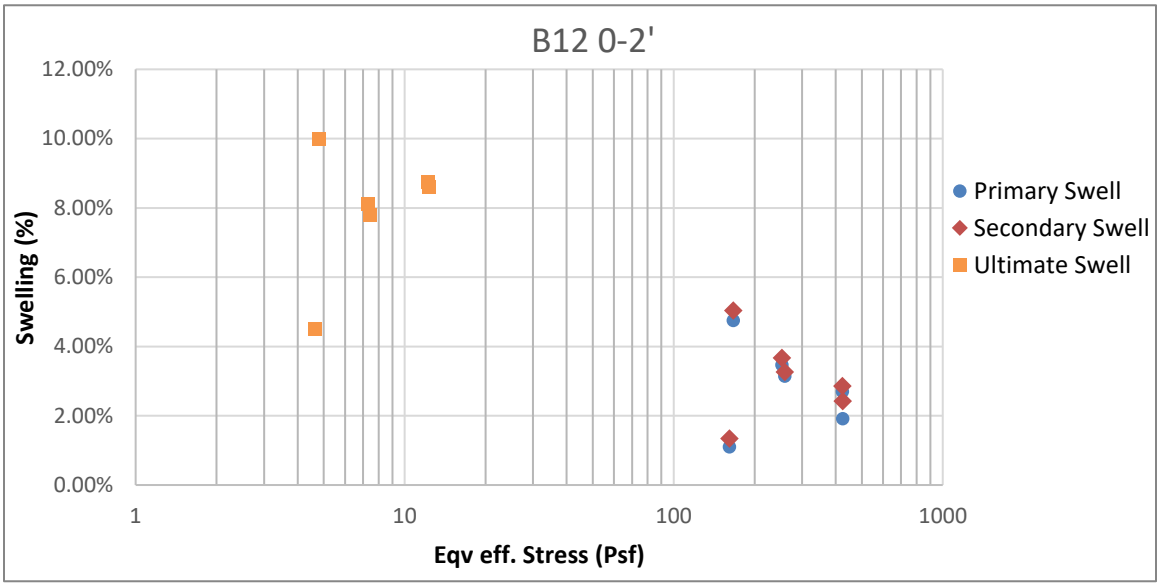



*Figure 54 Boring 12, 0-2 ft. depth.*


*Figure 55 Boring 12, 4-6 ft. depth.*

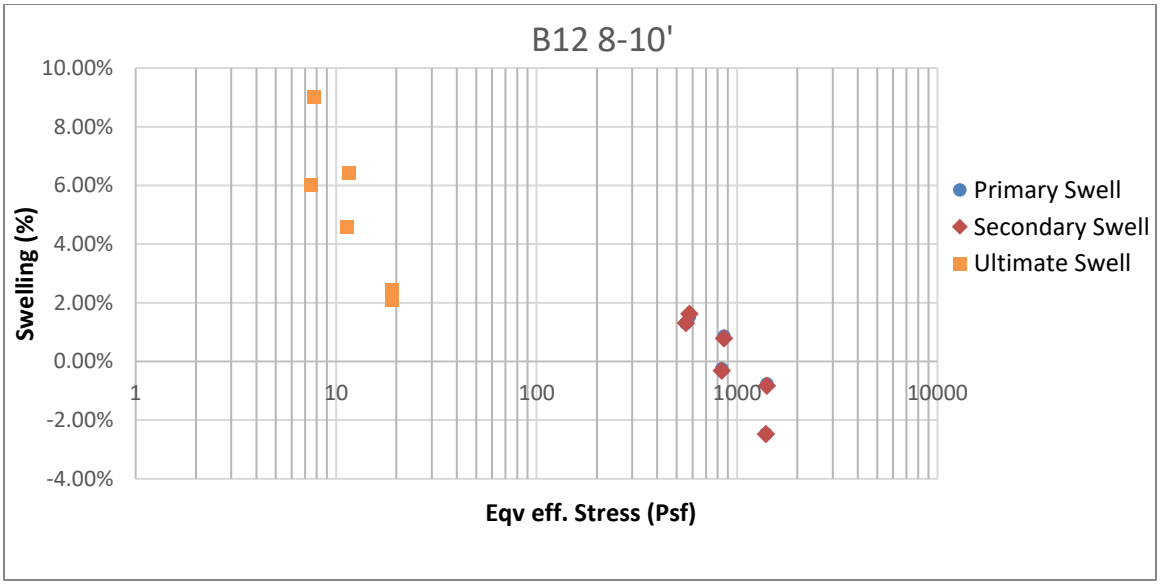



*Figure 56 Boring 12, 8-10 ft. depth.*

## Boring 13

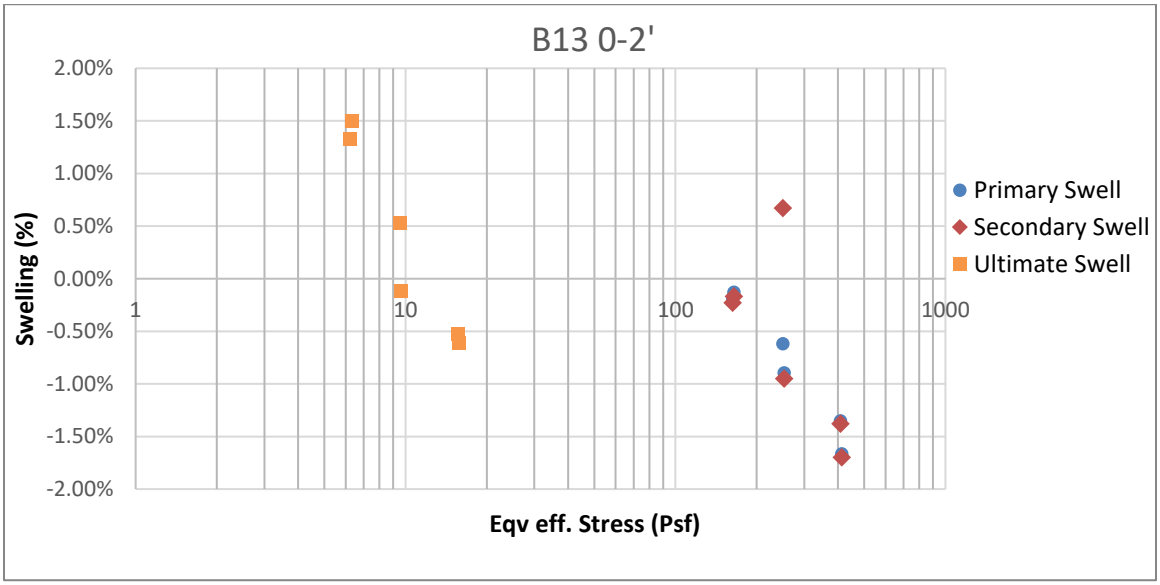



*Figure 57 Boring 13, 0-2 ft. depth.*

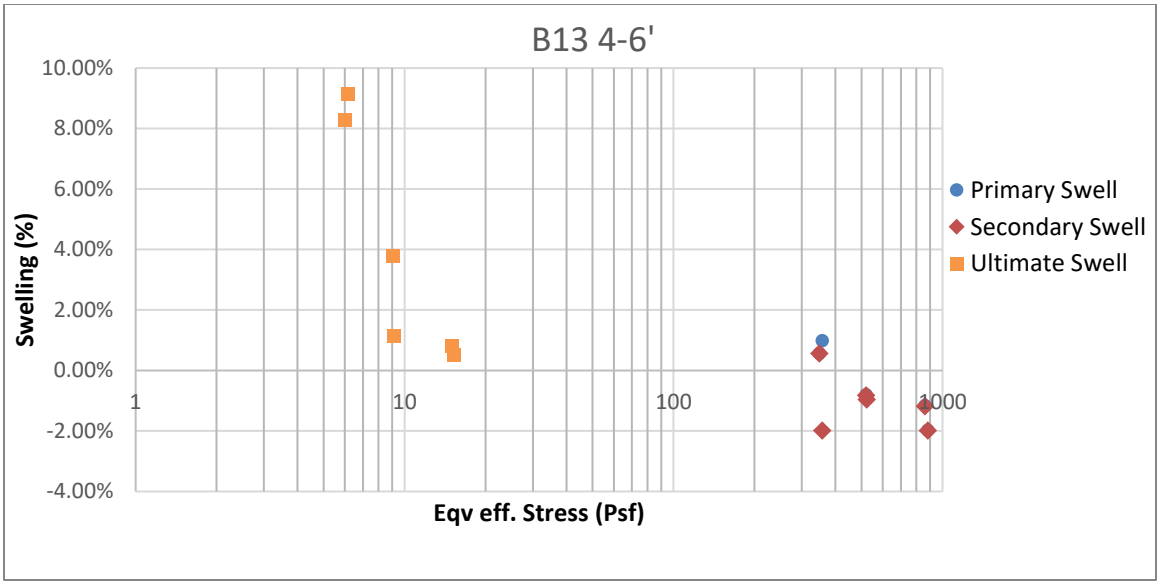



*Figure 58 Boring 13, 4-6 ft. depth.*

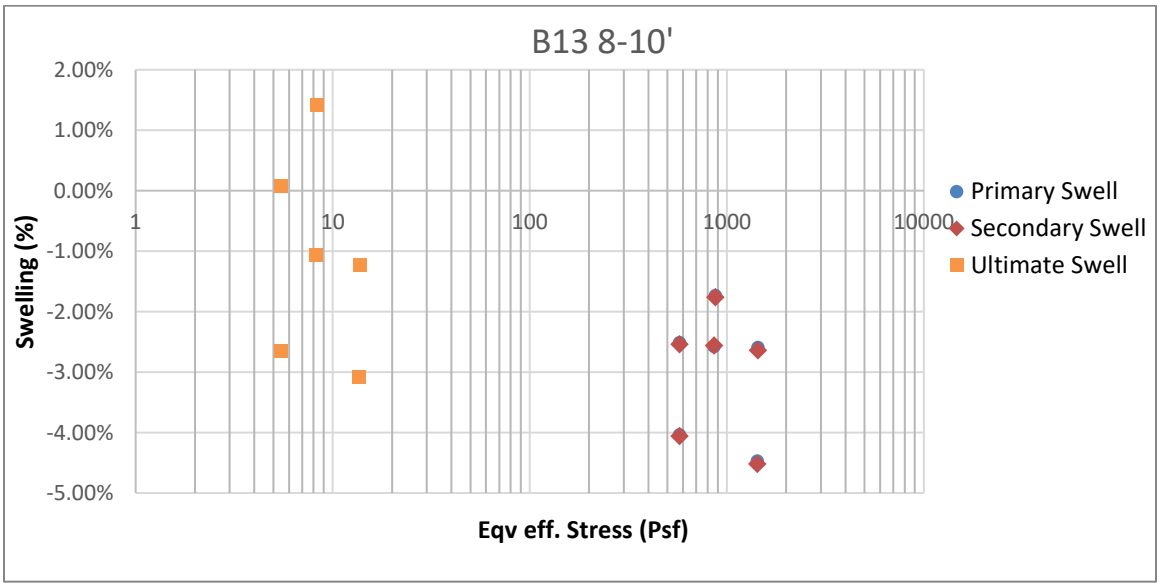



*Figure 59 Boring 13, 8-10 ft. depth.*

## Boring 15

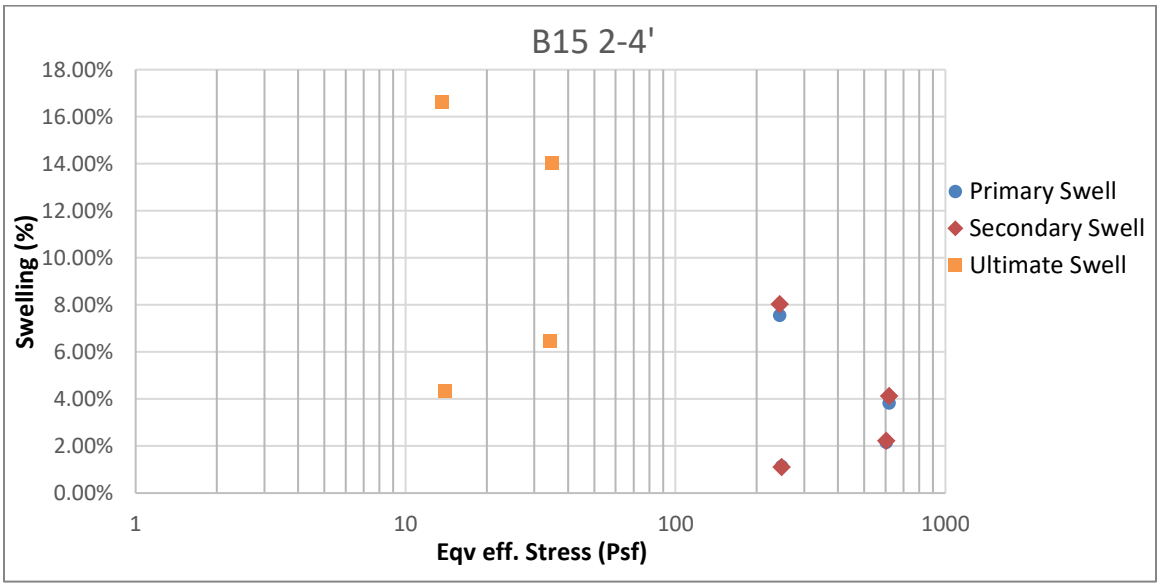



*Figure 60 Boring 15, 2-4 ft. depth.*

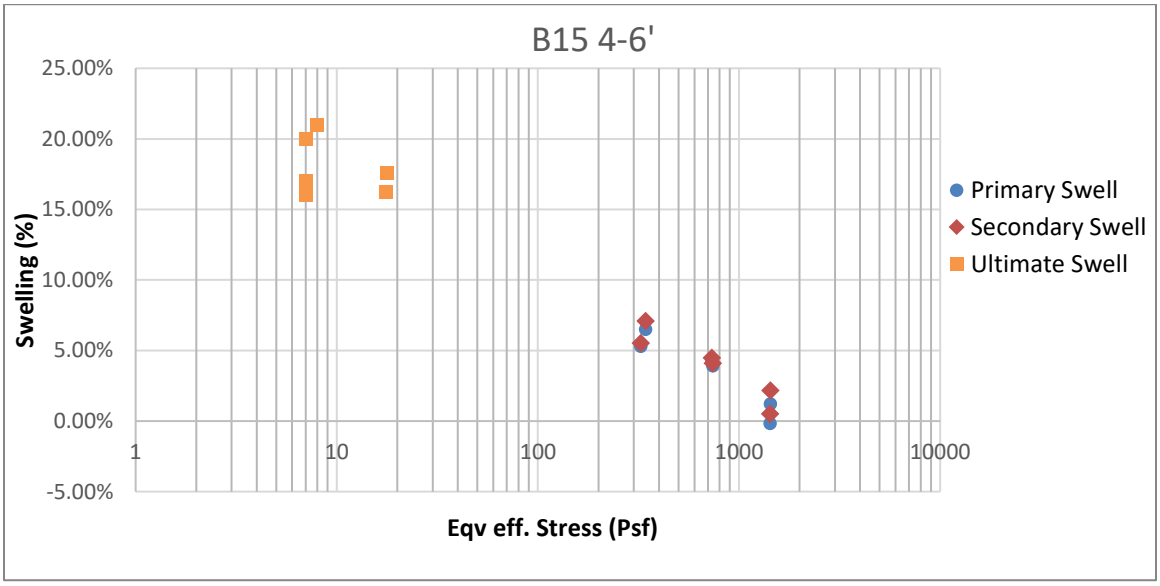



*Figure 61 Boring 15, 4-6 ft. depth.*

## Boring 16

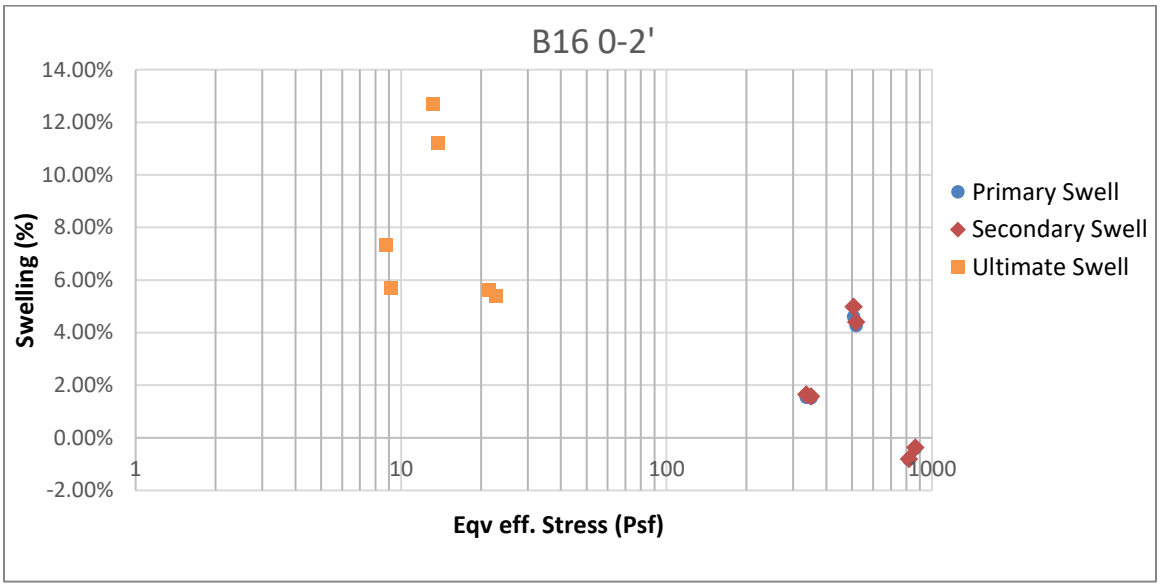



*Figure 62 Boring 16, 0-2 ft. depth.*

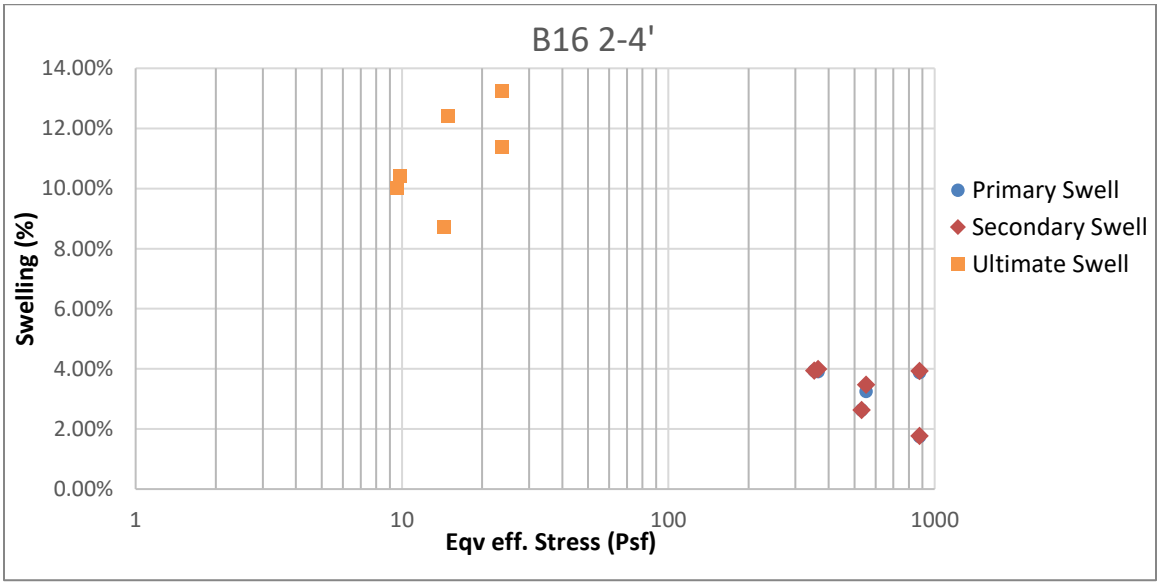



*Figure 63 Boring 16, 2-4 ft. depth.*

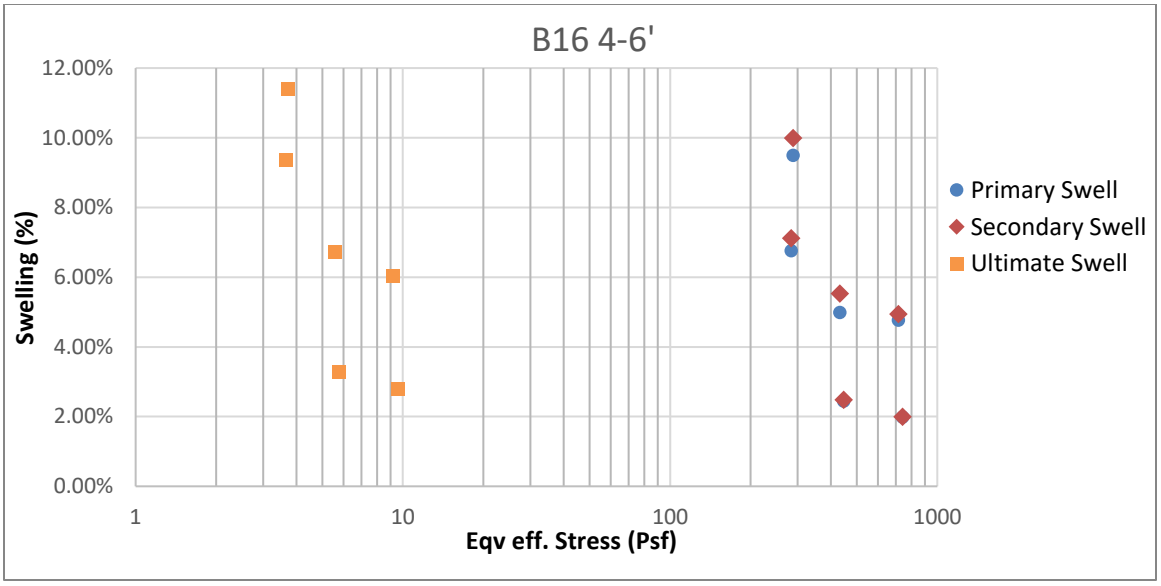



*Figure 64 Boring 16, 4-6 ft. depth.*

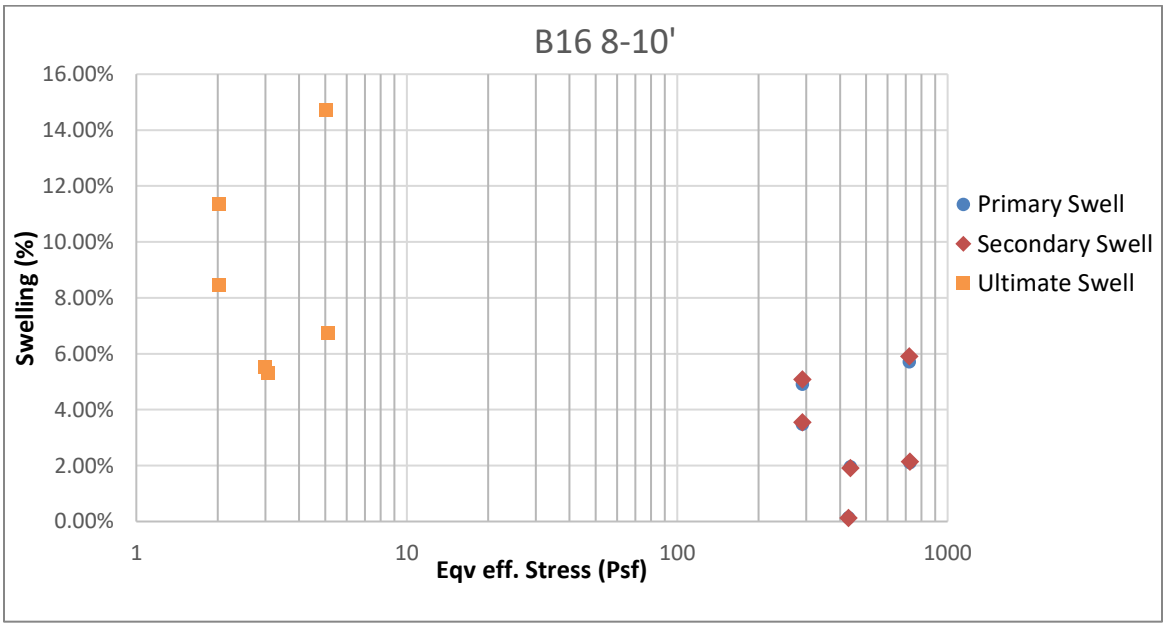



*Figure 65 Boring 16, 8-10 ft. depth.*

# Chapter 6: Observations

## 6.1 BORING 1

1. The Plastic Limit increased with the depth. Deeper soils were more plastic than the soils near to the surface.
2. The samples changed from dark grey to tan with depth. Depths 6-8 ft and 8-10 ft were tan. The samples from the deeper depths were more brittle compared to the samples from the top.
3. There was significant amount of swelling in the samples with as high as 36% under rebound.
4. Due to some issues in the DAQ when the machine ran at high RPM, the data could not be collected for samples under high stresses and only rebound curve was recovered.
5. There was less scatter in the swell data implying that the samples were quite homogeneous.

## 6.2 BORING 2

1. The samples were similar to the one from Boring and showed significant swelling.
2. Visually, the samples transitioned from black/dark grey to tan with increase in depth.

3. However, the tan samples from the deeper spectrum were not brittle unlike Boring 1.
4. Scattered gravel was present in the topmost depth (0-2 ft).

### 6.3 BORING 3

1. The samples were tan in color with a mix of red as well. The red color may imply oxidization.
2. All the depths for this point were high in plasticity and swelled quite well.
3. There was some scatter in the swell data as all the samples were not homogeneous because of the presence of the red clay as well which was non-uniformly mixed.

### 6.4 BORING 4

1. The samples increased in plasticity with increase in depth.
2. The samples were dark grey in the upper depths and tan in the lower depths. The samples from 6-8 ft and 8-10 ft were most brittle with some light grey high plastic clay in them.
3. There was less scatter in the stress-swell data and the samples swelled quite a lot under the respective stresses.

### 6.5 BORING 5

1. The samples increased in plasticity with depth and transitioned from dark grey to tan and were high plasticity clays except for the bottom most depth which was low plasticity silt.
2. Scattered gravel was observed in the upper depths and the samples from 0-2ft were observed to have some silt content as well.
3. The samples were quite homogeneous in their respective depths and there was less scatter in the stress-swell data.
4. Samples from lower depths showed most ultimate swell under rebound stress (unloaded conditions).

### 6.6 BORING 6

1. The samples were very high in plasticity and showed significant swelling as well.
2. The swelling decreased as the stress was increased which was expected but under rebound stress, the samples swelled upto 35%.
3. The samples from 4-6ft swelled the most and they had the highest LL (90) and PI (70) as well.

### 6.7 BORING 7

1. The samples from the topmost depth had scattered gravel in them which got into the trimmed samples as well, significantly contributing to the non-uniform swell data.
2. Samples showed more swelling in the deeper spectrum than on the top despite being subjected to higher stress.
3. The bottom most depth showed the highest swelling under unloaded conditions, which was expected as that had the highest PI as well.

### 6.8 BORING 8

1. These samples had some silty core in them in some sections of the log, which was treated as a foreign material.
2. Overall, all the logs from this boring were consistently tan in color with some red clay mixed in them. They were probably oxidized which is why the red color.
3. All the samples swelled significantly and were relatively homogeneous as well.

### 6.9 BORING 9

1. The samples were dark grey at the top depths and went tan in the bottom depths.

2. The samples did not swell much compared to other borings having high PI. The highest swell under stress was around 4% and under rebound was around 13%.
3. The samples were observed to be homogeneous with less scatter in the stress-swell data.
4. The bottom most depth could not be tested for swelling as the log dried and became too hard to be trimmed conventionally.

### 6.10 BORING 10

1. The samples were high plastic clays and transitioned from dark grey/black to light grey with the depth.
2. The samples were very wet and had to be kept for a longer period time to moisture adjust, with some samples losing as much as 12g of water in weight.
3. The samples from 4-6ft and 8-10ft could not be tested as they over dried while moisture adjusting and became too hard to trim. Also, they would swell very high in that condition and overestimate the results.

### 6.11 BORING 11

1. The samples were low plastic clay/silt with high content of Calcite present throughout.
2. The bottom depths had more calcite in powder form and hence they did not show much swelling,

3. Because of the arbitrary distribution of calcite in the logs, there was a lot of scatter in the stress-swell data.

*Figure 66 Boring 11, 2-4 ft. depth having high calcite content.*

## 6.12 BORING 12

1. The logs contained high amount of sand in them and were brick red in color.
2. They were low in plasticity and showed less swelling as well.

*Figure 67 Boring 12 showing high amounts of sand.*

## 6.13 BORING 13

1. All the samples were sandy with very low clay content.

2. They were soft sand and would easily fall apart while trimming.
3. The samples had very low PI and instead of swelling, the sampled collapsed further.

### 6.14 BORING 14

1. The samples were very hard right from the extrusion in the field. They were red in color and were very sandy with some clay just like Boring 12.
2. The samples were quite dry and had low PI.
3. They could not be tested for swelling as they were too hard to trim conventionally.

### 6.15 BORING 15

1. The topmost depth was very silty, with organics mixed and lots of scattered gravel.
2. Depths 2-4ft and 4-6ft had very white clay with some section being sandy and some section with sandy core.
3. A mixed array of samples was trimmed from these and tested for swelling and therefore, a lot of scatter in the data can be noticed.
4. Depths 6-8ft and 8-10ft were split spoon samples with silt/sand content, dark grey/black in color and hence could not be tested as they could not be trimmed.

*Figure 668 Boring 15 with sandy core.*

## 6.16 BORING 16

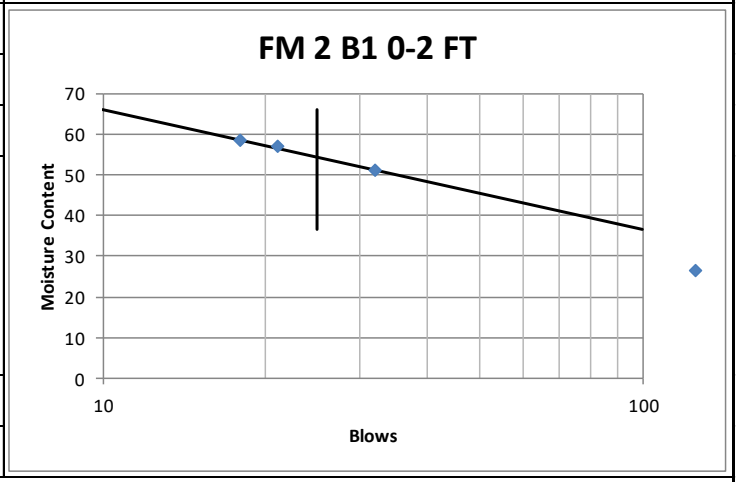
1. These samples were tan in color and were silty.
2. Depth 6-8 ft had a big chunk of duct tape in it and hence was skipped for swell test as data from it could not be trusted.
3. The samples showed swelling up to 10% under stresses and around 14% when under rebound.
4. There was significant scatter in the data.

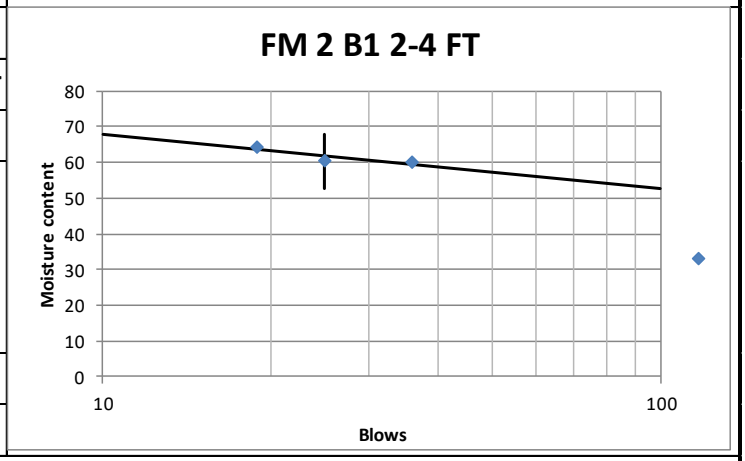
# Chapter 7: Recommendations and Scope of Future Work

The following recommendations are made based on the observations presented in Chapter 6:

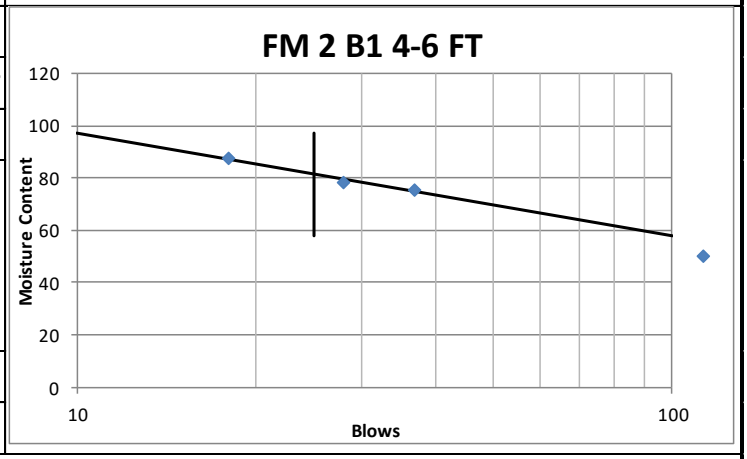
1. Careful measures need to be taken to extrude the bore logs in order to avoid mix-ups with other soil samples and foreign materials and objects.
2. If the same bore log has different materials, it is important to find the correct representative material for the analysis and characterization.
3. Since significant amount of scatter was observed as the bore logs were heterogeneous throughout, it is recommended that some tests be done by remolding them to check if the data is improved
4. Further study is recommended for samples which need to be remolded or compacted like split spoon samples in order to get the right density.
5. With this data, further study can be done in terms of PVR calculation and correlation with Pavement damage.
6. Another scope of this study can be the measurement of water absorbed by the samples while under stresses in centrifuges and how it is related with the other characteristics of the soil.

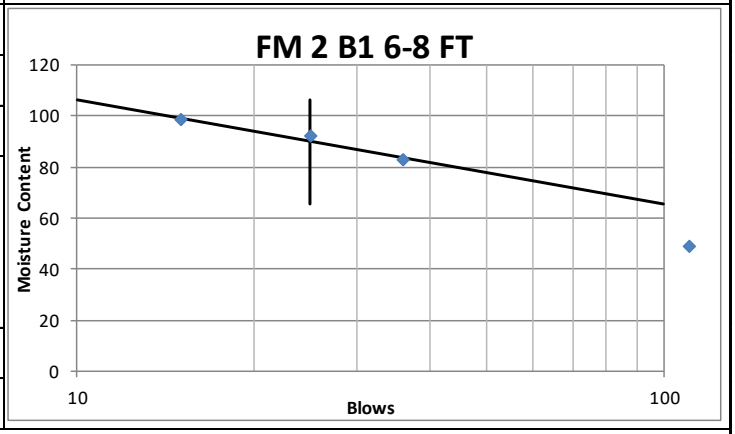
# Appendix A

| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B1 |  | | | |
| Depth | 0-2 FT | | | | |
| Operator | Shivangi | | | | |
| | | | | | |
| Preparation Date | 2/1/2019 | | | | |
| Time | | | | | |
| | | | | | |
| Testing Date | 2/1/2019 | | ***LL*** | ***PL*** | ***PI*** |
| Time | | | ***54*** | ***26*** | ***29*** |

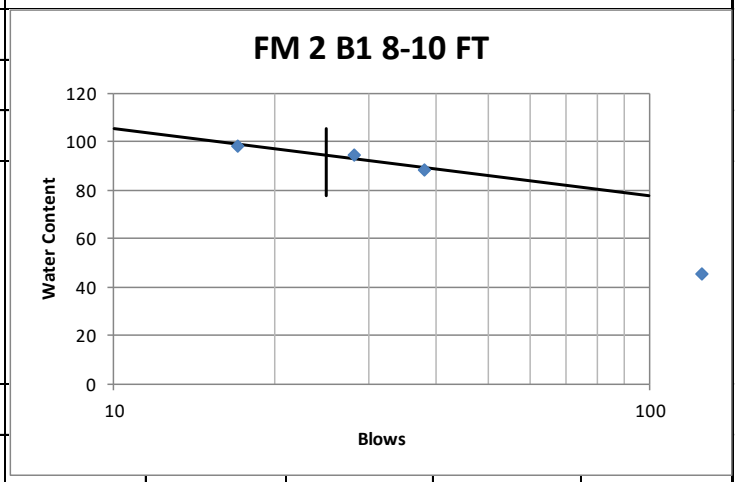
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B1 |  | | | |
| Depth | 2-4 FT | | | | |
| Operator | Shivangi | | | | |
| Preparation Date | 2/1/2019 | | | | |
| Time | | | | | |
| Testing Date | 2/1/2019 | | LL | PL | PI |
| Time | | | 62 | 21 | 41 |

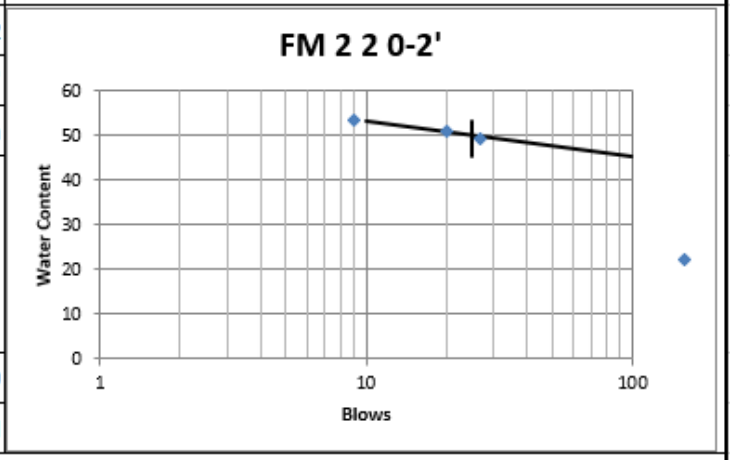


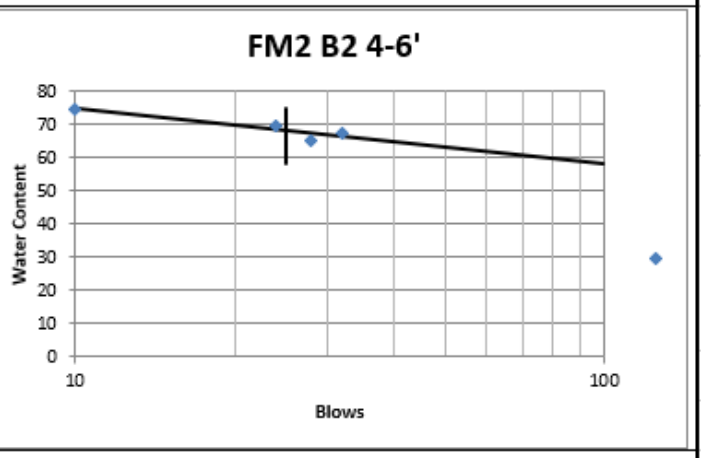
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B1 |  | | | |
| Depth | 4-6 FT | | | | |
| Operator | Shivangi | | | | |
| Preparation Date | 2/1/2019 | | | | |
| Time | | | | | |
| Testing Date | 2/1/2019 | | LL | PL | PI |
| Time | | | 82 | 24 | 58 |

| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B1 |  | | | |
| Depth | 6-8 FT | | | | |
| Operator | Shivangi | | | | |
| | | | | | |
| Preparation Date | 2/1/2019 | | | | |
| Time | | | | | |
| | | | | | |
| Testing Date | 2/1/2019 | | LL | PL | PI |
| Time | | | 90 | 25 | 65 |

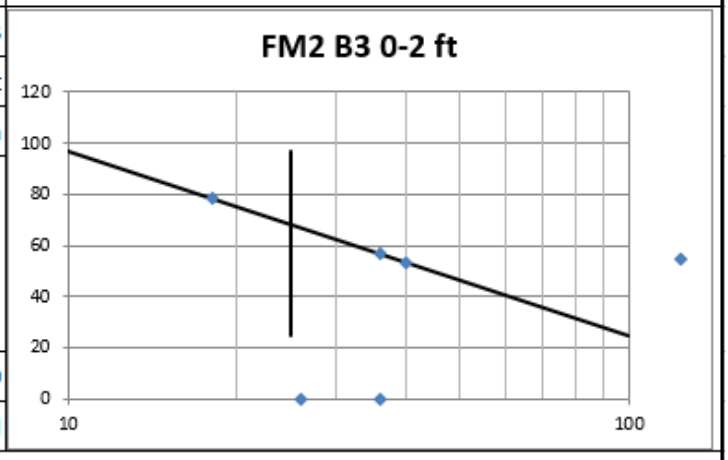


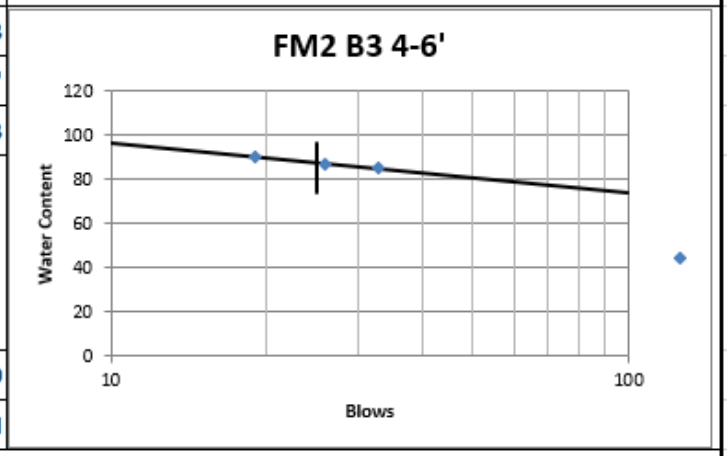
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B1 |  | | | |
| Depth | 8-10 FT | | | | |
| Operator | Shivangi | | | | |
| | | | | | |
| Preparation Date | 2/1/2019 | | | | |
| Time | | | | | |
| | | | | | |
| Testing Date | 2/1/2019 | | LL | PL | PI |
| Time | | | 95 | 27 | 68 |

| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | 2 |  | | | |
| Depth | 0-2' | | | | |
| Operator | Ruben | | | | |
| | | | | | |
| Preparation Date | 2/13/2019 | | | | |
| Time | 11:30 AM | | | | |
| | | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 50 | 19 | 31 |

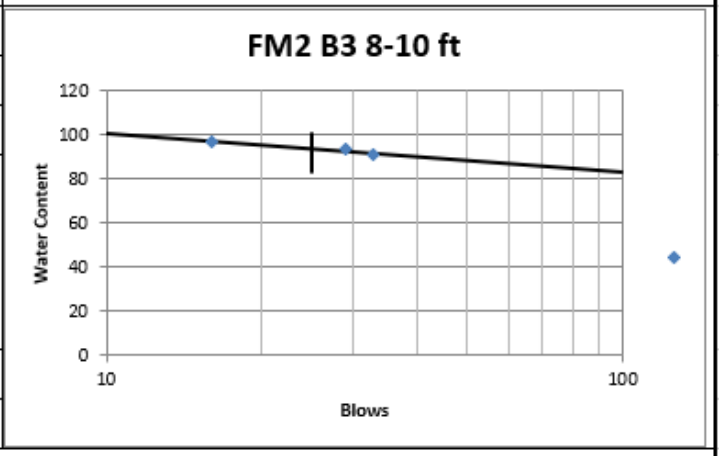
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B2 |  | | | |
| Depth | 4-6' | | | | |
| Operator | Ruben Dimas | | | | |
| | | | | | |
| Preparation Date | 2/27/2019 | | | | |
| Time | 10:00 AM | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 68 | 14 | 54 |

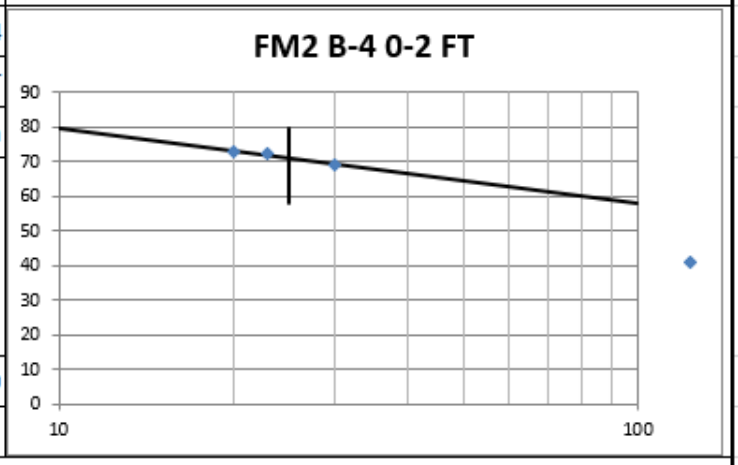


| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B3 |  | | | |
| Depth | 0-2 ft | | | | |
| Operator | Ruben | | | | |
| During Training Phase | | | | | |
| Preparation Date | 2/11/2019 | | | | |
| Time | 10:00 AM | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 68 | 15 | 54 |

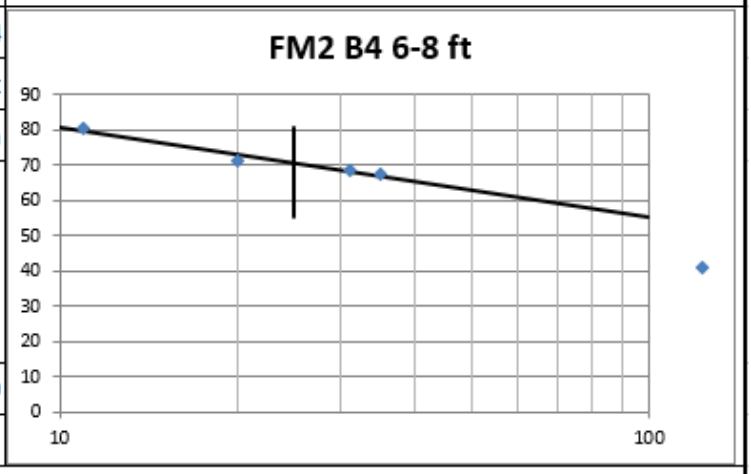
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B3 |  | | | |
| Depth | 4-6' | | | | |
| Operator | Ruben Dimas/CRB | | | | |
| Preparation Date | 2/27/2019 | | | | |
| Time | 10:00 AM | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 88 | 22 | 66 |

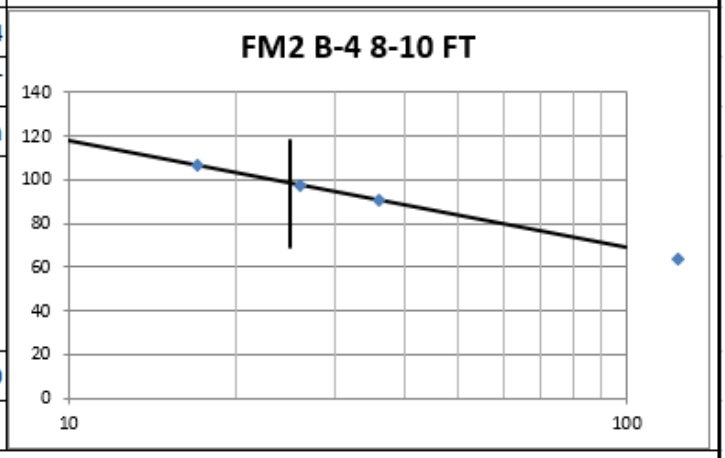


| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B3 |  | | | |
| Depth | 8-10 ft | | | | |
| Operator | Ruben Dimas | | | | |
| Preparation Date | 6-Mar-19 | | | | |
| Time | 1:00 PM | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 94 | 32 | 62 |

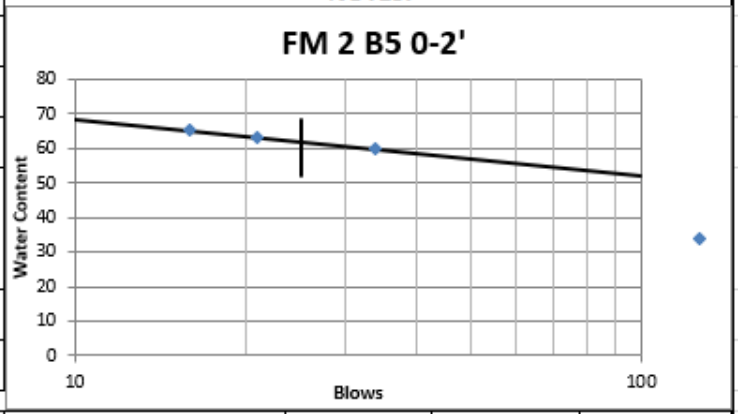
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B-4 |  | | | |
| Depth | 0-2 FT | | | | |
| Operator | Jenna | | | | |
| | | | | | |
| Preparation Date | 3/27/2019 | | | | |
| Time | | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 71 | 24 | 47 |

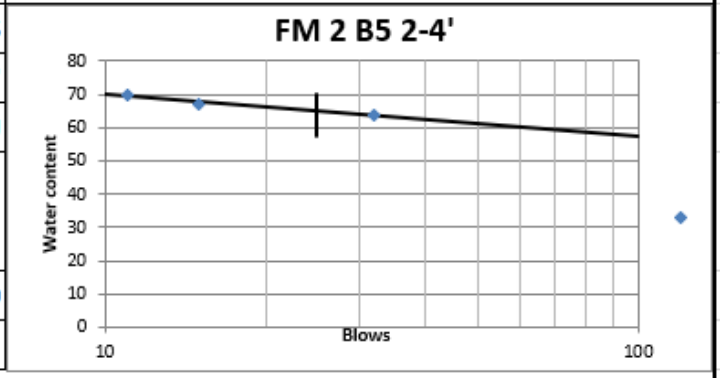


| Soil | FM2 | NOTES: | | | |
|---|---|---|---|---|---|
| Boring | B4 |  | | | |
| Depth | 6-8 ft | | | | |
| Operator | Ruben | | | | |
| | | | | | |
| Preparation Date | 1/30/2019 | | | | |
| Time | | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 71 | 15 | 55 |

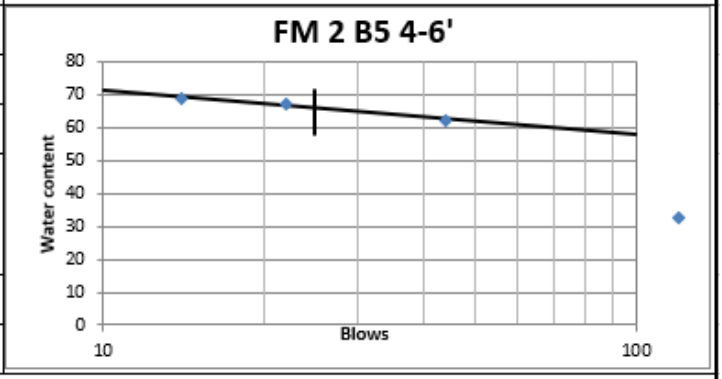
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B-4 |  | | | |
| Depth | 8-10 FT | | | | |
| Operator | Jenna | | | | |
| | | | | | |
| Preparation Date | 3/29/2019 | | | | |
| Time | | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 98 | 24 | 75 |

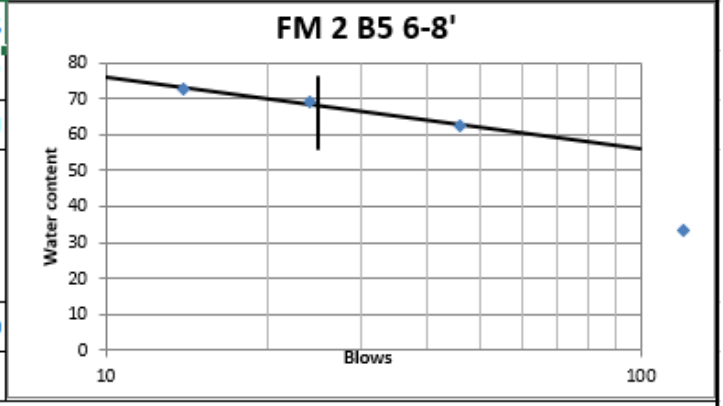


| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B5 |  | | | |
| Depth | 0-2' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 62 | 21 | 41 |

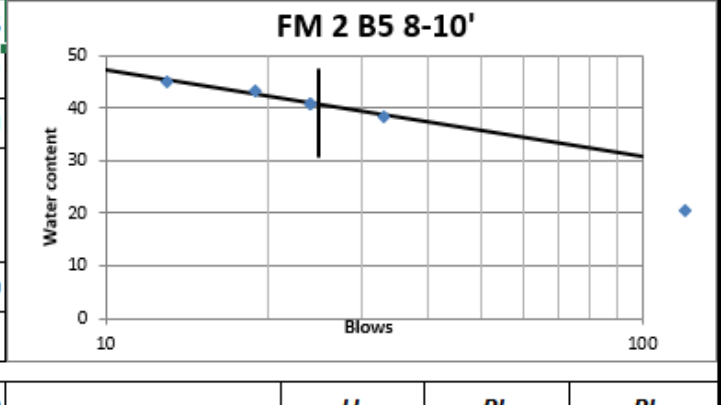
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B5 |  | | | |
| Depth | 2-4' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 65 | 23 | 41 |

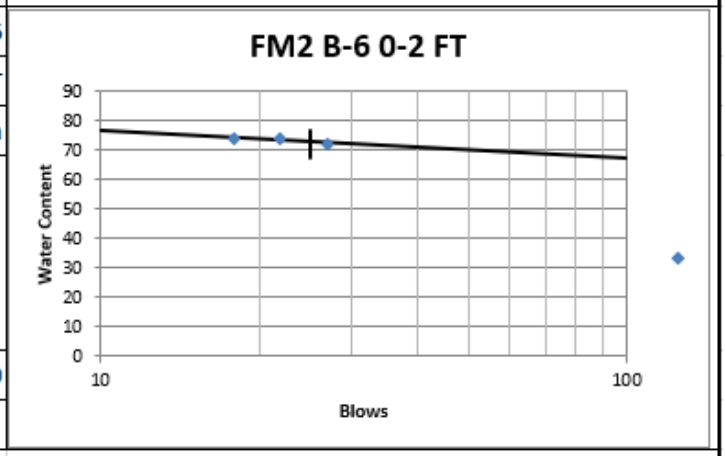


| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B5 |  | | | |
| Depth | 4-6' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 66 | 23 | 43 |

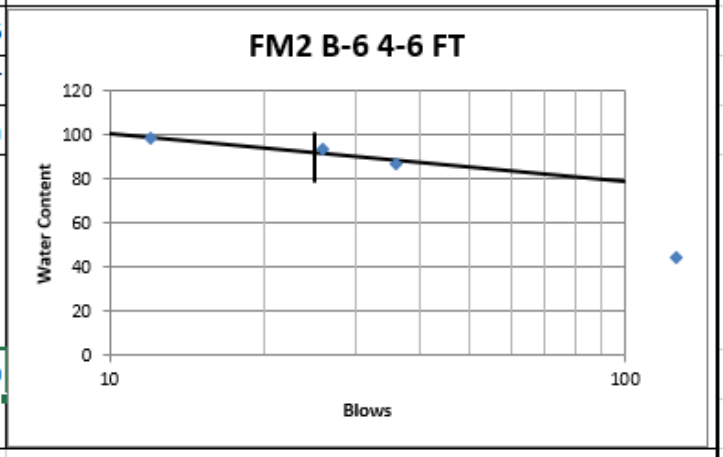
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B5 |  | | | |
| Depth | 6-8' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 68 | 21 | 47 |



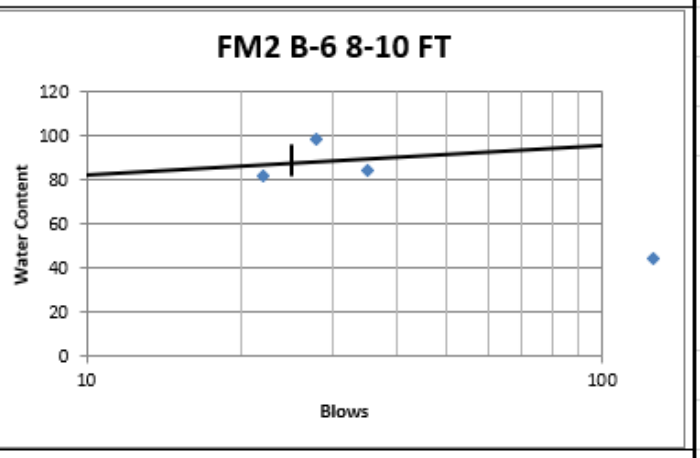
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B5 |  | | | |
| Depth | 8-10' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 41 | 14 | 27 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-6 |  | | | | |
| Depth | 0-2 FT | | | | | |
| Operator | Jenna | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Preparation Date | 4/1/2019 | | | | | |
| Time | | | | | | |
| | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 23.5 | | 73 | 23 | 50 |

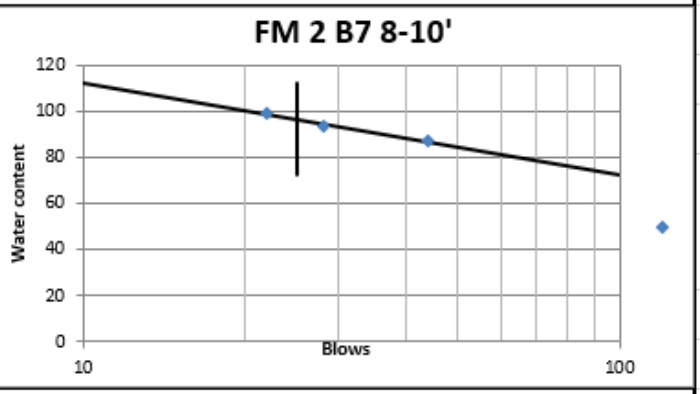


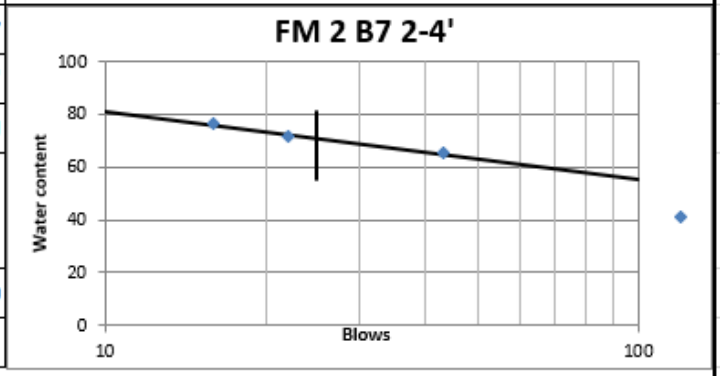
| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-6 |  | | | | |
| Depth | 4-6 FT | | | | | |
| Operator | Jenna | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Preparation Date | 4/1/2019 | | | | | |
| Time | | | | | | |
| | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 27.4 | | 92 | 22 | 70 |

| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-6 | | | | | |
| Depth | 8-10 FT | | | | | |
| Operator | Jenna | | | | | |
| Preparation Date | 4/3/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 26.5 | | 88 | 21 | 67 |

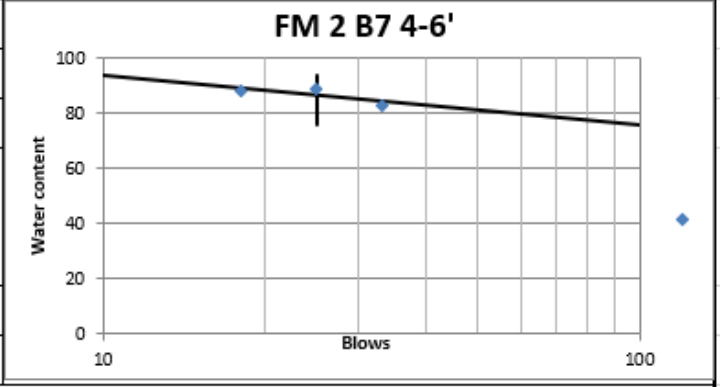


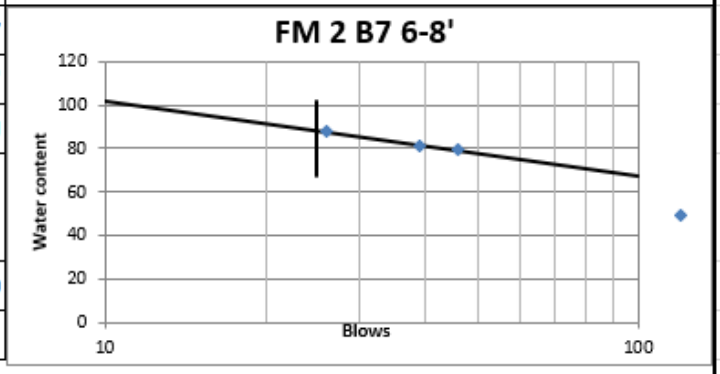

| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | | |
| Boring | B7 | | | | | |
| Depth | 8-10' | | | | | |
| Operator | SJ | | | | | |
| Preparation Date | 3/6/2019 | | | | | |
| Time | | | | | | |
| Testing Date | 3/6/2019 | | | LL | PL | PI |
| Time | | | | 96 | 27 | 70 |



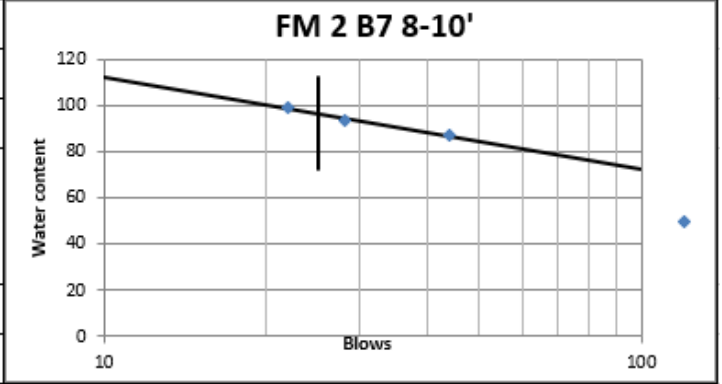
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B7 |  | | | |
| Depth | 2-4' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 71 | 24 | 47 |

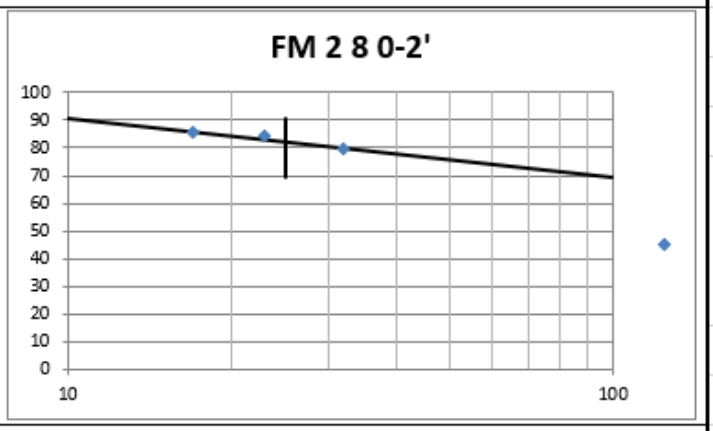


| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B7 |  | | | |
| Depth | 4-6' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 87 | 23 | 64 |

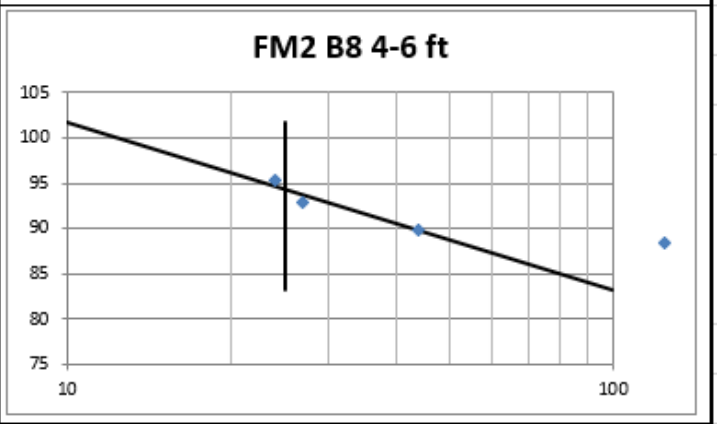
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B7 |  | | | |
| Depth | 6-8' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 88 | 24 | 65 |

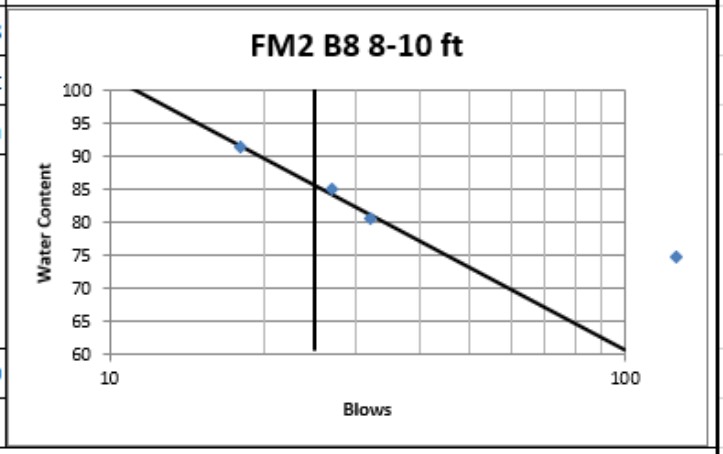


| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B7 |  | | | |
| Depth | 8-10' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 96 | 27 | 70 |

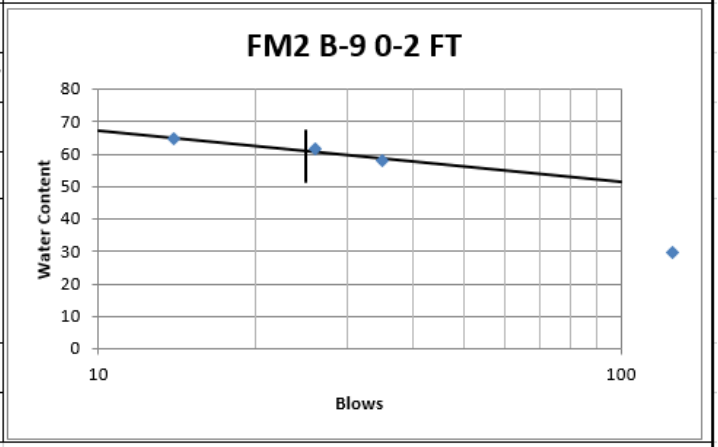
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | 8 |  | | | |
| Depth | 0-2' | | | | |
| Operator | Jenna | | | | |
| Preparation Date | | | | | |
| Time | | | | | |
| Testing Date | 3/11/2019 | | LL | PL | PI |
| Time | | | 82 | 24 | 58 |



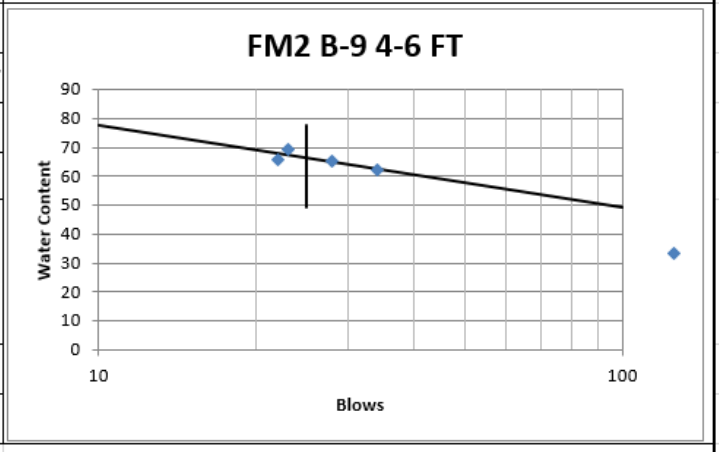
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B8 |  | | | |
| Depth | 4-6 ft | | | | |
| Operator | Jenna | | | | |
| Preparation Date | | | | | |
| Time | | | | | |
| Testing Date | 3/8/2019 | | LL | PL | PI |
| Time | | | 94 | 25 | 69 |

| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B8 |  | | | |
| Depth | 8-10 ft | | | | |
| Operator | Jenna | | | | |
| Preparation Date | 3/6/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/6/2019 | | LL | PL | PI |
| Time | | | 86 | 29 | 57 |

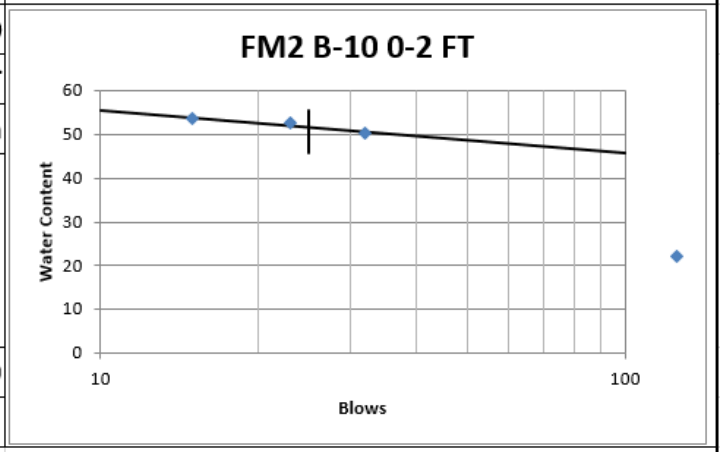


| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | | | | | |
| Boring | B-9 |  | | | | |
| Depth | 0-2 FT | | | | | |
| Operator | Jenna Song | | | | | |
| Checked By | Calvin Blake | | | | | |
| Preparation Date | 4/15/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 21.2 | | 61 | 19 | 42 |

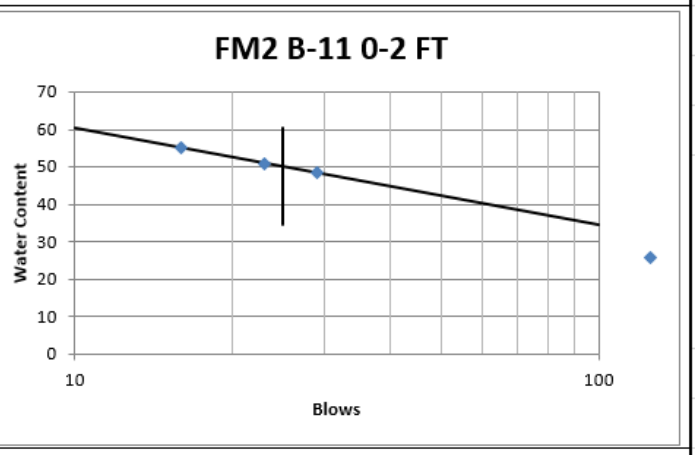
| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | | | | | |
| Boring | B-9 | | | | | |
| Depth | 4-6 FT | | | | | |
| Operator | Jenna Song | | | | | |
| Checked By | Calvin Blake | | | | | |
| Notes | Additional LL Test (D) By SJ confirms values | | | | | |
| Preparation Date | 4/15/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 22.3 | | 66 | 16 | 50 |



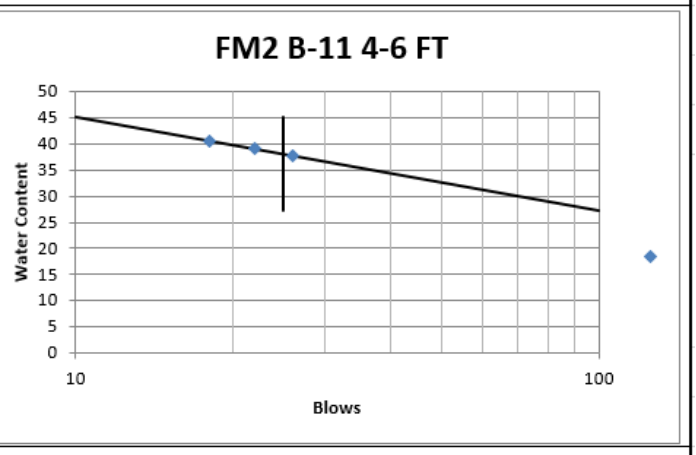

| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-10 | | | | | |
| Depth | 0-2 FT | | | | | |
| Operator | Jenna | | | | | |
| Preparation Date | 4/3/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 19.3 | | 52 | 18 | 33 |



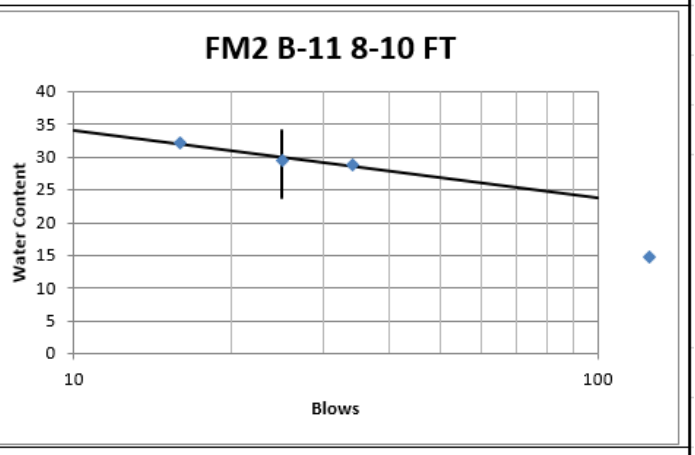
| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-11 | | | | | |
| Depth | 0-2 FT | | | | | |
| Operator | Jenna | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Preparation Date | 4/17/2019 | | | | | |
| Time | | | | | | |
| | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 19.0 | | 50 | 14 | 37 |



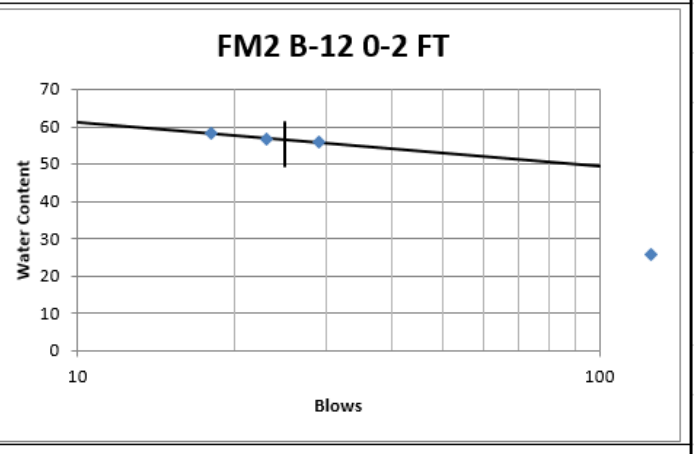

| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-11 | | | | | |
| Depth | 4-6 FT | | | | | |
| Operator | Jenna | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Preparation Date | 4/17/2019 | | | | | |
| Time | | | | | | |
| | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 16.6 | | 38 | 11 | 27 |



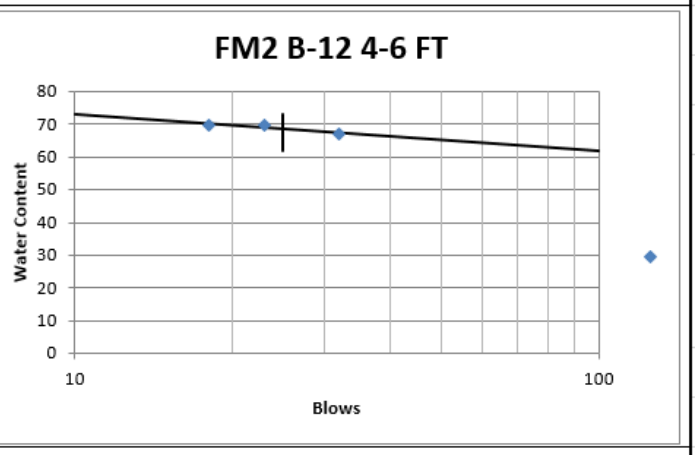
| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-11 | | | | | |
| Depth | 8-10 FT | | | | | |
| Operator | Jenna | | | | | |
| Preparation Date | 4/19/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 15.0 | | 30 | 17 | 13 |



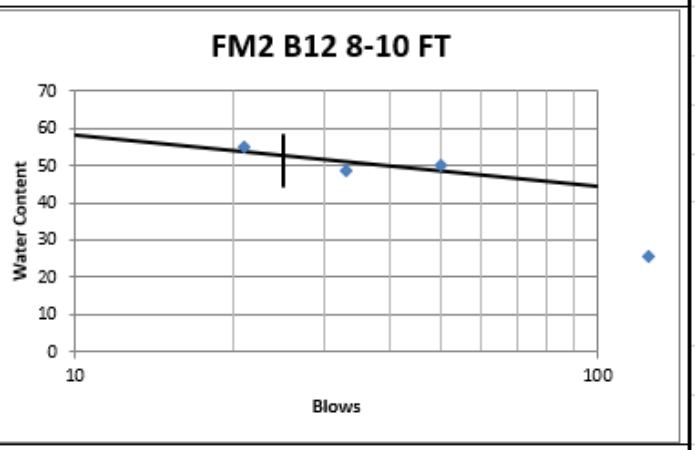

| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-12 | | | | | |
| Depth | 0-2 FT | | | | | |
| Operator | Jenna | | | | | |
| Preparation Date | 4/19/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 20.3 | | 56 | 16 | 41 |



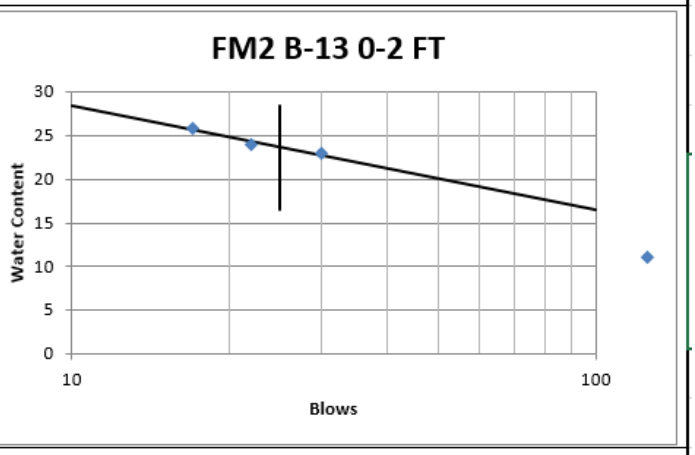
| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-12 | | | | | |
| Depth | 4-6 FT | | | | | |
| Operator | Jenna | | | | | |
| Preparation Date | 4/22/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 22.7 | | 69 | 17 | 51 |



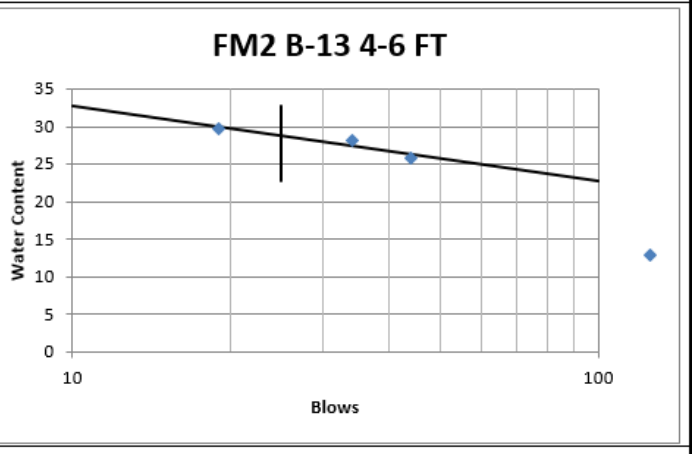

| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | | | | | |
| Boring | B12 | | | | | |
| Depth | 8-10 FT | | | | | |
| Operator | Jenna | | | | | |
| Checked By | CRB | | | | | |
| Preparation Date | 4/19/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 19.6 | | 53 | 14 | 38 |

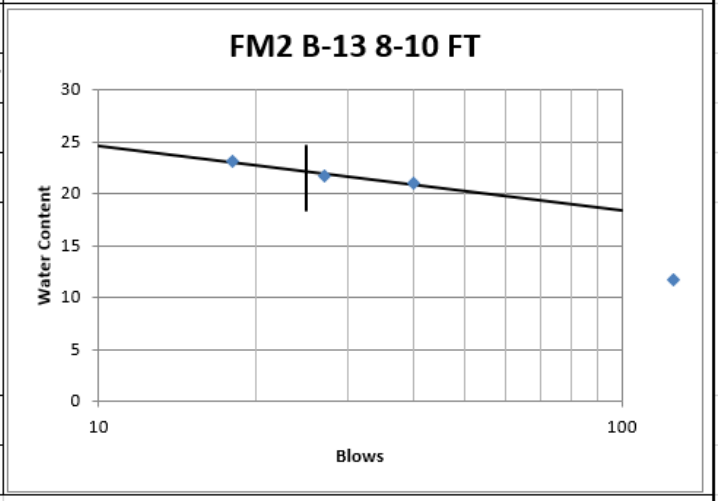


| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-13 | | | | | |
| Depth | 0-2 FT | | | | | |
| Operator | Jenna | | | | | |
| Preparation Date | 4/22/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 13.7 | | 24 | 16 | 8 |

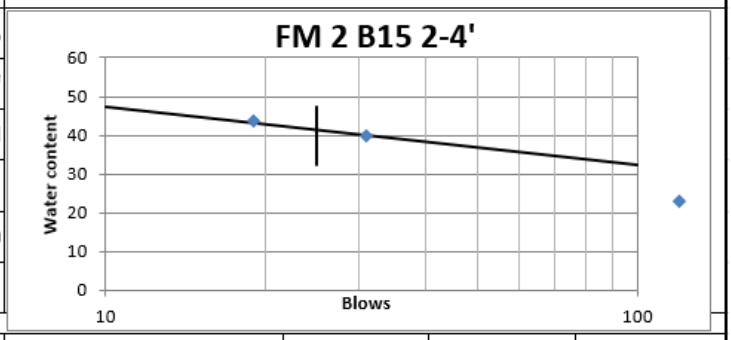


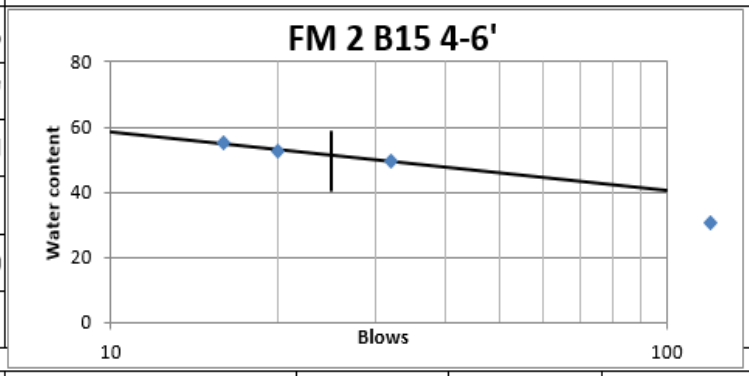

| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-13 | | | | | |
| Depth | 4-6 FT | | | | | |
| Operator | RUBEN | | | | | |
| Preparation Date | 4/22/2019 | | | | | |
| Time | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 14.7 | | 29 | 17 | 11 |



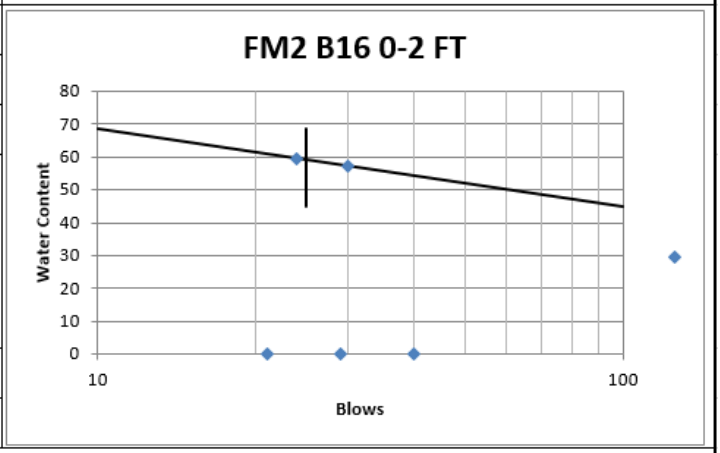
| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil/Project | FM2 | NOTES: | | | | |
| Boring | B-13 |  | | | | |
| Depth | 8-10 FT | | | | | |
| Operator | ? | | | | | |
| Checked By | CRB | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Preparation Date | 4/22/2019 | | | | | |
| Time | | | | | | |
| | | | | | | |
| Testing Date | | TxDOT Dry | | LL | PL | PI |
| Time | | 13.4 | | 22 | 13 | 9 |

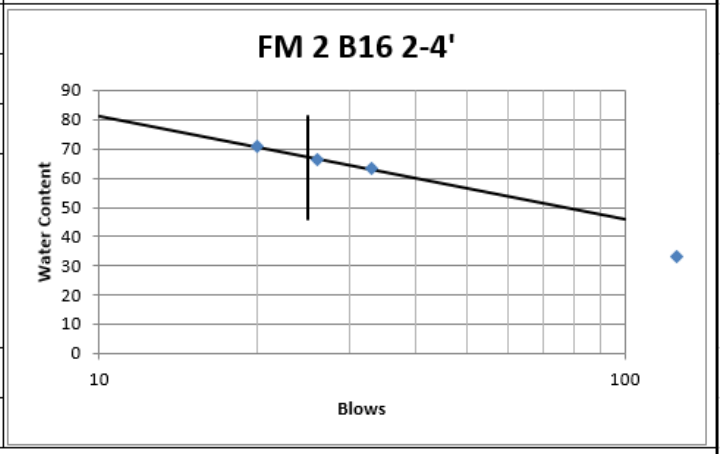


| 1. TEST INFORMATION | | | | | | |
|---|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | | |
| Boring | B15 |  | | | | |
| Depth | 2-4' | | | | | |
| Operator | SJ | | | | | |
| | | | | | | |
| Preparation Date | 3/16/2019 | | | | | |
| Time | | | | | | |
| | | | | | | |
| Testing Date | 3/16/2019 | | | LL | PL | PI |
| Time | | | | 41 | 15 | 26 |

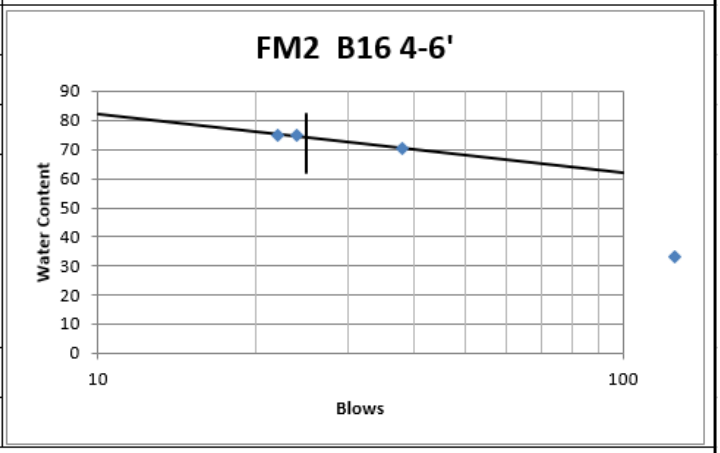
| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B15 |  | | | |
| Depth | 4-6' | | | | |
| Operator | SJ | | | | |
| | | | | | |
| Preparation Date | 3/17/2019 | | | | |
| Time | | | | | |
| Testing Date | 3/17/2019 | | LL | PL | PI |
| Time | | | 51 | 17 | 35 |

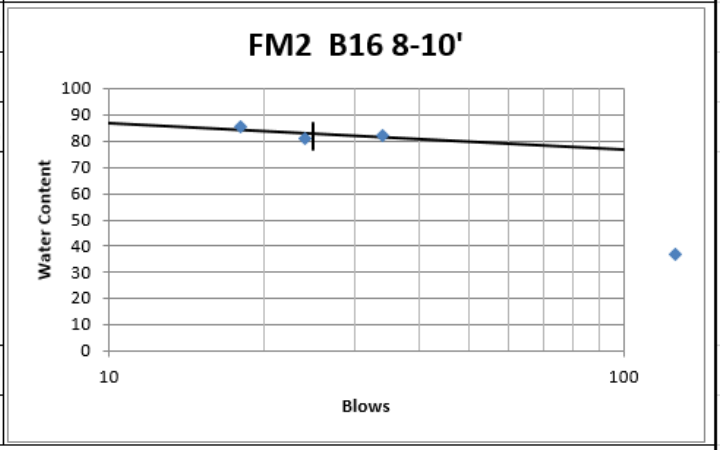


| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B16 |  | | | |
| Depth | 0-2 FT | | | | |
| Operator | ? | | | | |
| | | | | | |
| Preparation Date | ? | | | | |
| Time | | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 59 | 18 | 41 |

| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM 2 | NOTES: | | | |
| Boring | B16 |  | | | |
| Depth | 2-4' | | | | |
| Operator | Jenna | | | | |
| Was this really Boring 2? | | | | | |
| Preparation Date | 2/25/2019 | | | | |
| Time | | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 67 | 18 | 50 |



| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B16 |  | | | |
| Depth | 4-6' | | | | |
| Operator | Jenna Song | | | | |
| | | | | | |
| Preparation Date | 2/15/2019 | | | | |
| Time | | | | | |
| Testing Date | | | LL | PL | PI |
| Time | | | 74 | 20 | 54 |

| 1. TEST INFORMATION | | | | | |
|---|---|---|---|---|---|
| Soil | FM2 | NOTES: | | | |
| Boring | B16 |  | | | |
| Depth | 8-10' | | | | |
| Operator | Jenna Song | | | | |
| | | | | | |
| Preparation Date | 2/15/2019 | | | | |
| Time | | | | | |
| Testing Date | | | *LL* | *PL* | *PI* |
| Time | | | *83* | *23* | *60* |

# Appendix B

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/12/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

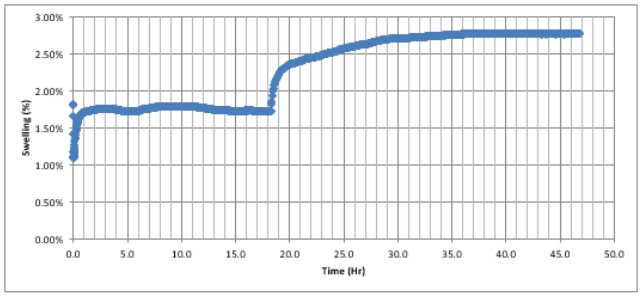
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM | |
| Boring | 1 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.39 | g |
| Dry Unit Weight | 14.54 | kN/m$^3$ |
| Height of Sample | 10.201 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.83 | g's |
| Sample Height | - | 4.841 | mm |
| Testing Height | 10.167 | 10.349 | mm |
| Void Ratio, e | 0.821 | 0.854 | - |
| Moisture content, ω | 22.4% | 32.3% | - |
| Degree of Saturation | 73.6% | 100.0% | - |
| Change in ω | - | 10.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.29 | cm |
| Primary Swell | - | 1.8% | % |
| Ultimate Swell | - | 2.8% | % |
| Volume | 20.61 | 20.98 | cm$^3$ |
| Change in Volume | - | 0.37 | cm$^3$ |
| Mass of Water Lost | - | 5.49 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.24% | %/log cycle | Primary Swell | 1.79% | Stress (psf) | 118.9 |
| Slope of Secondary | -0.21% | %/log cycle | Time to Swell (hr) | 8.25 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/12/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

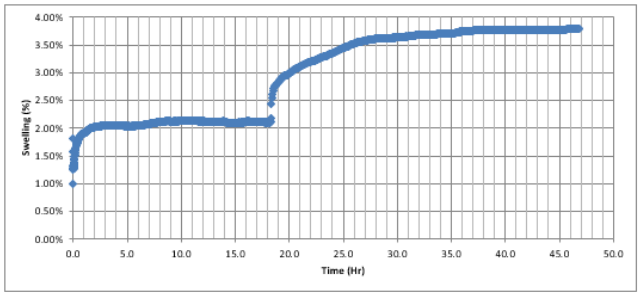
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM | |
| Boring | 1 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.76 | g |
| Dry Unit Weight | 14.75 | kN/m$^3$ |
| Height of Sample | 10.196 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.83 | g's |
| Sample Height | - | 4.782 | mm |
| Testing Height | 10.150 | 10.365 | mm |
| Void Ratio, e | 0.795 | 0.833 | - |
| Moisture content, | 22.0% | 32.4% | - |
| Degree of Saturation | 74.8% | 100.0% | - |
| Change in ω | - | 10.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.23 | cm |
| Primary Swell | - | 2.1% | % |
| Ultimate Swell | - | 3.8% | % |
| Volume | 20.57 | 21.01 | cm$^3$ |
| Change in Volume | - | 0.44 | cm$^3$ |
| Mass of Water Lost | - | 5.69 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.33% | %/log cycle | Primary Swell | 2.12% | Stress (psf) | 117.4 |
| Slope of Secondary | -0.11% | %/log cycle | Time to Swell (hr) | 8.55 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/12/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

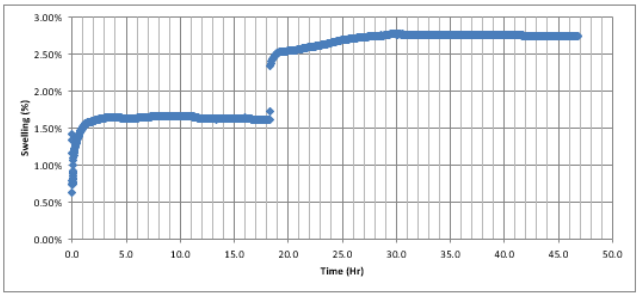
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM | |
| Boring | 1 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.33 | g |
| Dry Unit Weight | 14.39 | kN/m$^3$ |
| Height of Sample | 10.063 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.76 | g's |
| Sample Height | - | 7.235 | mm |
| Testing Height | 10.027 | 10.195 | mm |
| Void Ratio, e | 0.841 | 0.872 | - |
| Moisture content, | 21.9% | 31.8% | - |
| Degree of Saturation | 70.3% | 96.2% | - |
| Change in ω | - | 9.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.47 | cm |
| Primary Swell | - | 1.7% | % |
| Ultimate Swell | - | 2.7% | % |
| Volume | 20.32 | 20.66 | cm$^3$ |
| Change in Volume | - | 0.34 | cm$^3$ |
| Mass of water Lost | - | 9.20 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.30% | %/log cycle | Primary Swell | 1.68% | Stress (psf) | 178.5 |
| Slope of Secondary | -0.16% | %/log cycle | Time to Swell (hr) | 8.13 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/12/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

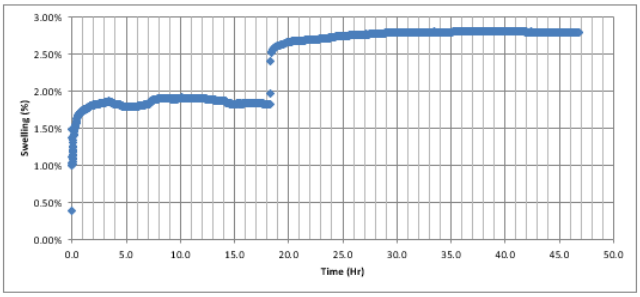
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM | |
| Boring | 1 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.50 | g |
| Dry Unit Weight | 14.64 | kN/m$^3$ |
| Height of Sample | 10.257 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.83 | g's |
| Sample Height | - | 4.575 | mm |
| Testing Height | 10.195 | 10.389 | mm |
| Void Ratio, e | 0.809 | 0.843 | - |
| Moisture content, | 21.6% | 30.6% | - |
| Degree of Saturation | 72.1% | 96.2% | - |
| Change in ω | - | 9.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.50 | cm |
| Primary Swell | - | 1.9% | % |
| Ultimate Swell | - | 2.8% | % |
| Volume | 20.66 | 21.06 | cm$^3$ |
| Change in Volume | - | 0.39 | cm$^3$ |
| Mass of water Lost | - | 3.52 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.28% | %/log cycle | Primary Swell | 1.90% | Stress (psf) | 179.6 |
| Slope of Secondary | -0.27% | %/log cycle | Time to Swell (hr) | 8.49 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/12/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

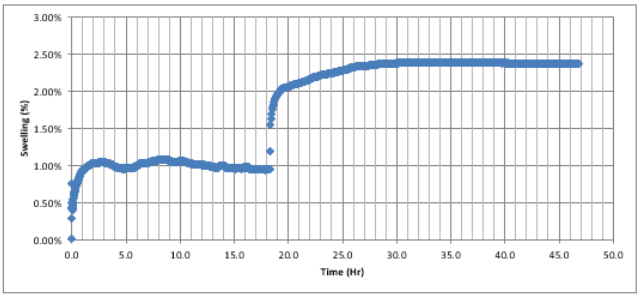
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM | |
| Boring | 1 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.65 | g |
| Dry Unit Weight | 14.14 | kN/m$^3$ |
| Height of Sample | 10.043 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.83 | g's |
| Sample Height | - | 11.174 | mm |
| Testing Height | 9.996 | 10.105 | mm |
| Void Ratio, e | 0.873 | 0.894 | - |
| Moisture content, | 22.1% | 32.7% | - |
| Degree of Saturation | 68.3% | 96.2% | - |
| Change in ω | - | 10.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.40 | cm |
| Primary Swell | - | 1.1% | % |
| Ultimate Swell | - | 2.4% | % |
| Volume | 20.26 | 20.48 | cm$^3$ |
| Change in Volume | - | 0.22 | cm$^3$ |
| Mass of Water Lost | - | 6.05 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.28% | %/log cycle | Primary Swell | 1.08% | Stress (psf) | 296.9 |
| Slope of Secondary | -0.47% | %/log cycle | Time to Swell (hr) | 8.47 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/12/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

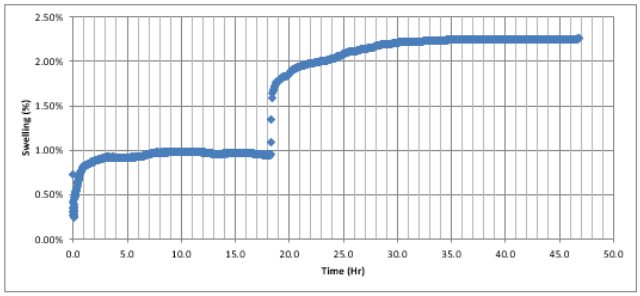
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM | |
| Boring | 1 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.49 | g |
| Dry Unit Weight | 14.43 | kN/m$^3$ |
| Height of Sample | 10.084 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.67 | g's |
| Sample Height | - | 11.136 | mm |
| Testing Height | 10.037 | 10.135 | mm |
| Void Ratio, e | 0.836 | 0.854 | - |
| Moisture content, | 22.0% | 31.3% | - |
| Degree of Saturation | 70.9% | 96.3% | - |
| Change in ω | - | 9.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.40 | cm |
| Primary Swell | - | 1.0% | % |
| Ultimate Swell | - | 2.2% | % |
| Volume | 20.34 | 20.54 | cm$^3$ |
| Change in Volume | - | 0.20 | cm$^3$ |
| Mass of Water Lost | - | 4.19 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.30% | %/log cycle | Primary Swell | 0.98% | Stress (psf) | 294.3 |
| Slope of Secondary | -0.05% | %/log cycle | Time to Swell (hr) | 7.84 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/13/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Shivangi |

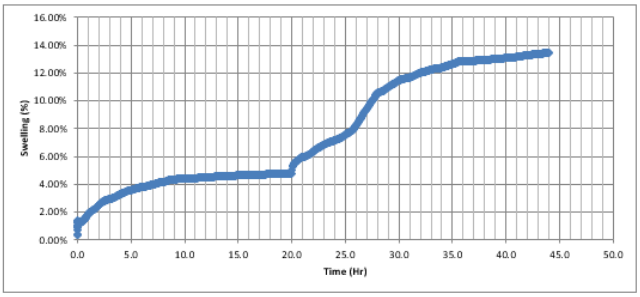
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.17 | g |
| Dry Unit Weight | 15.50 | kN/m$^3$ |
| Height of Sample | 10.267 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 15.87 | g's |
| Sample Height | - | 5.544 | mm |
| Testing Height | 10.194 | 10.630 | mm |
| Void Ratio, e | 0.709 | 0.782 | - |
| Moisture content, ω | 23.0% | 36.6% | - |
| Degree of Saturation | 87.8% | 100.0% | - |
| Change in ω | - | 13.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.49 | cm |
| Primary Swell | - | 4.3% | % |
| Ultimate Swell | - | 13.0% | % |
| Volume | 20.66 | 21.55 | cm$^3$ |
| Change in Volume | - | 0.88 | cm$^3$ |
| Mass of Water Lost | - | 3.66 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.94% | %/log cycle | Primary Swell | 4.28% | Stress (psf) | 198.5 |
| Slope of Secondary | 1.34% | %/log cycle | Time to Swell (hr) | 8.22 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducte | 2/13/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Shivangi |

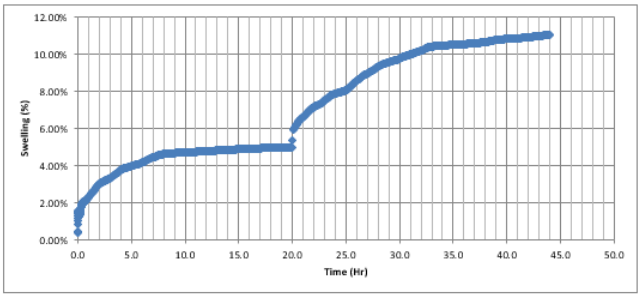
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.57 | g |
| Dry Unit Weight | 15.31 | kN/m$^3$ |
| Height of Sample | 10.124 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 15.84 | g's |
| Sample Height | - | 5.019 | mm |
| Testing Height | 10.062 | 10.534 | mm |
| Void Ratio, e | 0.730 | 0.811 | - |
| Moisture content, | 24.3% | 36.0% | - |
| Degree of Saturation | 90.0% | 100.0% | - |
| Change in ω | - | 11.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.43 | cm |
| Primary Swell | - | 4.7% | % |
| Ultimate Swell | - | 10.8% | % |
| Volume | 20.39 | 21.35 | cm$^3$ |
| Change in Volume | - | 0.96 | cm$^3$ |
| Mass of Water Lost | - | 2.24 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.99% | %/log cycle | Primary Swell | 4.70% | Stress (psf) | 194.2 |
| Slope of Secondary | 0.96% | %/log cycle | Time to Swell (hr) | 9.12 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/13/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | Shivangi |

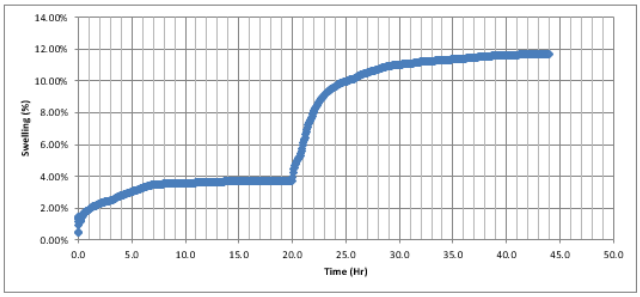
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.93 | g |
| Dry Unit Weight | 15.36 | kN/m$^3$ |
| Height of Sample | 10.043 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 15.90 | g's |
| Sample Height | - | 8.548 | mm |
| Testing Height | 9.976 | 10.334 | mm |
| Void Ratio, e | 0.724 | 0.786 | - |
| Moisture content, | 23.0% | 36.6% | - |
| Degree of Saturation | 85.6% | 100.0% | - |
| Change in ω | - | 13.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.17 | cm |
| Primary Swell | - | 3.6% | % |
| Ultimate Swell | - | 11.6% | % |
| Volume | 20.22 | 20.95 | cm$^3$ |
| Change in Volume | - | 0.73 | cm$^3$ |
| Mass of water Lost | - | 2.89 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.38% | %/log cycle | Primary Swell | 3.59% | Stress (psf) | 302.7 |
| Slope of Secondary | 0.50% | %/log cycle | Time to Swell (hr) | 9.54 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/13/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | Shivangi |

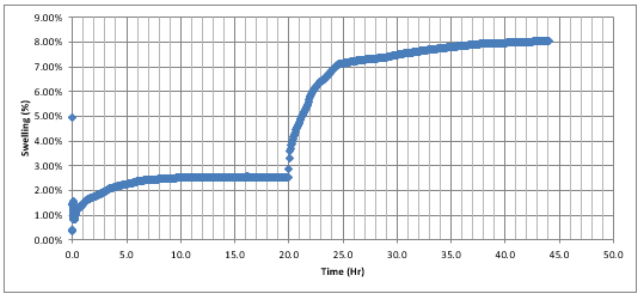
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.82 | g |
| Dry Unit Weight | 14.87 | kN/m$^3$ |
| Height of Sample | 10.343 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.04 | g's |
| Sample Height | - | 5.995 | mm |
| Testing Height | 10.239 | 10.561 | mm |
| Void Ratio, e | 0.781 | 0.826 | - |
| Moisture content, | 22.7% | 31.8% | - |
| Degree of Saturation | 78.3% | 92.9% | - |
| Change in ω | - | 9.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.29 | 3.82 | cm |
| Primary Swell | - | 2.5% | % |
| Ultimate Swell | - | 8.0% | % |
| Volume | 20.88 | 21.40 | cm$^3$ |
| Change in Volume | - | 0.53 | cm$^3$ |
| Mass of water Lost | - | 3.16 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.96% | %/log cycle | Primary Swell | 2.54% | Stress (psf) | 297.5 |
| Slope of Secondary | 0.09% | %/log cycle | Time to Swell (hr) | 9.98 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducte | 2/13/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Shivangi |

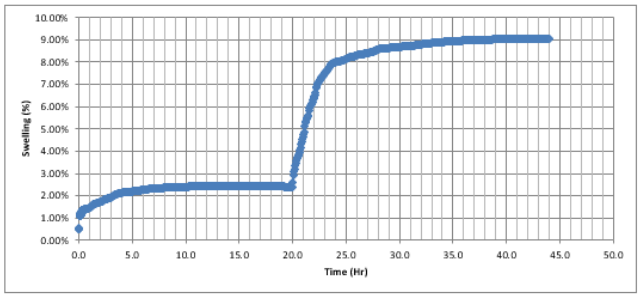
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.03 | g |
| Dry Unit Weight | 15.84 | kN/m$^3$ |
| Height of Sample | 10.114 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.04 | g's |
| Sample Height | - | 12.024 | mm |
| Testing Height | 10.039 | 10.283 | mm |
| Void Ratio, e | 0.672 | 0.713 | - |
| Moisture content, | 21.9% | 32.8% | - |
| Degree of Saturation | 87.8% | 100.0% | - |
| Change in ω | - | 10.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.31 | cm |
| Primary Swell | - | 2.4% | % |
| Ultimate Swell | - | 9.0% | % |
| Volume | 20.35 | 20.84 | cm$^3$ |
| Change in Volume | - | 0.49 | cm$^3$ |
| Mass of Water Lost | - | 2.58 | g |

NOTES




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.75% | %/log cycle | | Primary Swell | 2.43% | Stress (psf) | 440.1 |
| Slope of Secondary | 0.00% | %/log cycle | | Time to Swell (hr) | 9.88 | | |

Specimen:

Centrifuge Swelling

| | |
|---|---|
| Date test conduct | 2/13/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Shivangi |

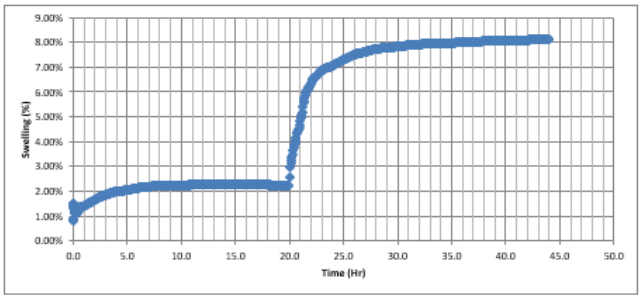
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.87 | g |
| Dry Unit Weight | 15.80 | kN/m³ |
| Height of Sample | 10.135 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.04 | g's |
| Sample Height | - | 11.270 | mm |
| Testing Height | 10.035 | 10.262 | mm |
| Void Ratio, e | 0.677 | 0.715 | - |
| Moisture | 21.7% | 32.0% | - |
| Degree of Saturation | 86.7% | 100.0% | - |
| Change in ω | - | 10.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.35 | cm |
| Primary Swell | - | 2.3% | % |
| Ultimate Swell | - | 8.1% | % |
| Volume | 20.34 | 20.80 | cm³ |
| Change in Volume | - | 0.46 | cm³ |
| Mass of water Lost | - | 2.95 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary | 0.68% | %/log cycle | Primary Swell | 2.27% | Stress (psf) 498.8 |
| Slope of Secondary | -0.05% | %/log cycle | Time to Swell | 10.19 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/5/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

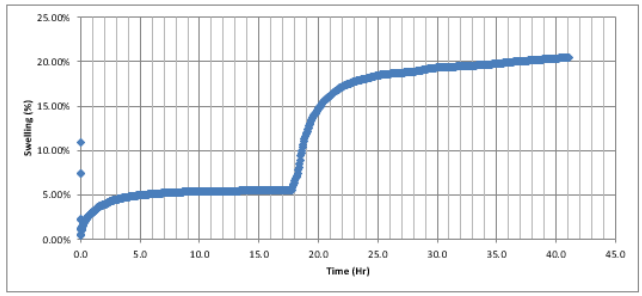
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 34.26 | g |
| Dry Unit Weight | 14.51 | kN/m³ |
| Height of Sample | 9.205 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.14 | g's |
| Sample Height | - | 3.810 | mm |
| Testing Height | 9.037 | 9.515 | mm |
| Void Ratio, e | 0.826 | 0.922 | - |
| Moisture content, ω | 26.5% | 47.3% | - |
| Degree of Saturation | 86.6% | 100.0% | - |
| Change in ω | - | 20.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.87 | cm |
| Primary Swell | - | 5.3% | % |
| Ultimate Swell | - | 20.4% | % |
| Volume | 18.32 | 19.29 | cm³ |
| Change in Volume | - | 0.97 | cm³ |
| Mass of Water Lost | - | 6.57 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.72% | %/log cycle | Primary Swell | 5.29% | Stress (psf) 324.5 |
| Slope of Secondary | 0.61% | %/log cycle | Time to Swell (hr) | 6.11 | |

Specimen:

Centrifuge Swelling

| | |
|---|---|
| Date test conduct | 2/5/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

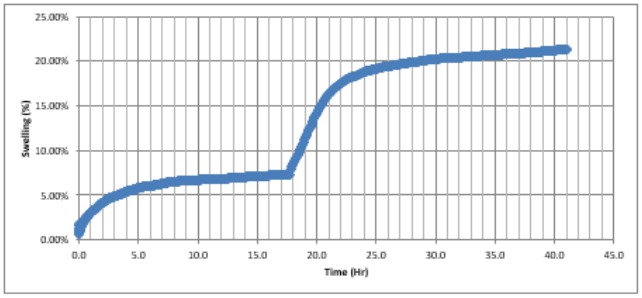
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.70 | g |
| Dry Unit Weight | 14.59 | kN/m³ |
| Height of Sample | 11.577 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 38.42 | g's |
| Sample Height | - | 5.975 | mm |
| Testing Height | 11.373 | 12.111 | mm |
| Void Ratio, e | 0.816 | 0.933 | - |
| Moisture | 27.5% | 46.7% | - |
| Degree of Saturation | 91.0% | 100.0% | - |
| Change in w | - | 19.2% | - |
| Overburden pr. | - | 0.00 | g |
| Height of water | 4.19 | 3.06 | cm |
| Primary Swell | - | 6.5% | % |
| Ultimate Swell | - | 21.3% | % |
| Volume | 23.05 | 24.55 | cm³ |
| Change in Volume | - | 1.50 | cm³ |
| Mass of water Lost | - | 6.61 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary | 3.65% | %/log cycle |
| Slope of Secondary | 2.33% | %/log cycle |

| | |
|---|---|
| Primary Swell | 6.49% |
| Time to Swell (t50) | 8.06 |

| | |
|---|---|
| Stress (psf) | 343.2 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Shivangi |

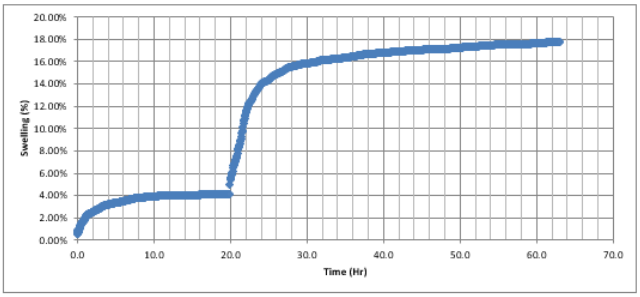
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.28 | g |
| Dry Unit Weight | 15.63 | kN/m$^3$ |
| Height of Sample | 11.481 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 75.58 | g's |
| Sample Height | - | 3.376 | mm |
| Testing Height | 11.376 | 11.822 | mm |
| Void Ratio, e | 0.694 | 0.761 | - |
| Moisture content, ω | 23.2% | 39.1% | - |
| Degree of Saturation | 90.4% | 100.0% | - |
| Change in ω | - | 15.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.23 | cm |
| Primary Swell | - | 3.9% | % |
| Ultimate Swell | - | 17.6% | % |
| Volume | 23.06 | 23.96 | cm$^3$ |
| Change in Volume | - | 0.90 | cm$^3$ |
| Mass of Water Lost | - | 7.56 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.86% | %/log cycle | Primary Swell | 3.92% | Stress (psf) | 739.7 |
| Slope of Secondary | 0.68% | %/log cycle | Time to Swell (hr) | 9.16 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Shivangi |

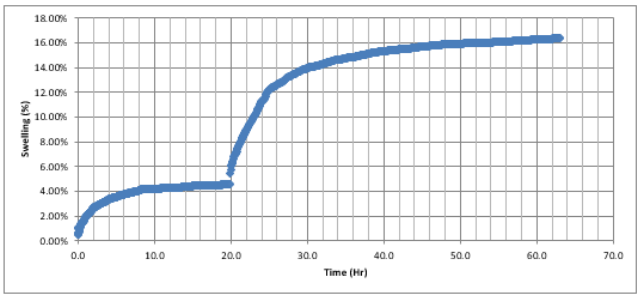
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.15 | g |
| Dry Unit Weight | 15.03 | kN/m$^3$ |
| Height of Sample | 11.466 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 74.88 | g's |
| Sample Height | - | 3.242 | mm |
| Testing Height | 11.396 | 11.877 | mm |
| Void Ratio, e | 0.762 | 0.837 | - |
| Moisture content, | 24.8% | 40.7% | - |
| Degree of Saturation | 87.7% | 100.0% | - |
| Change in ω | - | 15.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.08 | 2.82 | cm |
| Primary Swell | - | 4.2% | % |
| Ultimate Swell | - | 16.2% | % |
| Volume | 23.10 | 24.07 | cm$^3$ |
| Change in Volume | - | 0.98 | cm$^3$ |
| Mass of Water Lost | - | 10.92 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.01% | %/log cycle | Primary Swell | 4.22% | Stress (psf) | 731.3 |
| Slope of Secondary | 1.10% | %/log cycle | Time to Swell (hr) | 9.82 | | |

Specimen:

Centrifuge Swelling

| | |
|---|---|
| Date test conducted | 2/6/2013 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | Shivangi |

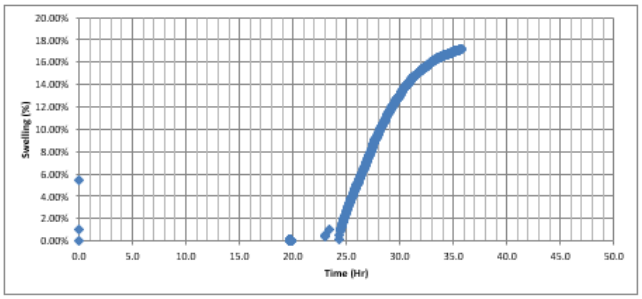
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.46 | g |
| Dry Unit Weight | 14.62 | kN/m³ |
| Height of Sample | 11.623 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.50 | g's |
| Sample Height | - | 7.021 | mm |
| Testing Height | 11.623 | 11.602 | mm |
| Void Ratio, e | 0.811 | 0.808 | - |
| Moisture content, ω | 26.6% | 46.2% | - |
| Degree of Saturation | 88.5% | 100.0% | - |
| Change in ω | - | 19.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.22 | cm |
| Primary Swell | - | -0.2% | % |
| Ultimate Swell | - | 17.2% | % |
| Volume | 23.56 | 23.52 | cm³ |
| Change in Volume | - | -0.04 | cm³ |
| Mass of Water Lost | - | 7.16 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary | 0.83% | %/log cycle | Primary Swell | -0.18% | Stress (psf) | 1424.0 |
| Slope of Secondary | 18.20% | %/log cycle | Time to Swell | 21.09 | | |

Specimen:

Centrifuge Swelling

| | |
|---|---|
| Date test conduct | 2/6/2013 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | Shivangi |

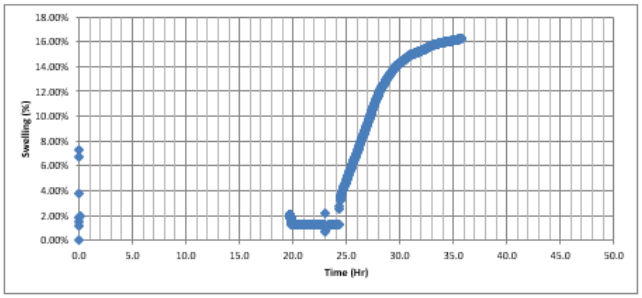
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.48 | g |
| Dry Unit Weight | 14.97 | kN/m³ |
| Height of | 11.384 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.55 | g's |
| Sample Height | - | 6.027 | mm |
| Testing Height | 11.384 | 11.523 | mm |
| Void Ratio, e | 0.770 | 0.791 | - |
| Moisture | 23.5% | 41.0% | - |
| Degree of | 82.5% | 100.0% | - |
| Change in ω | - | 17.4% | - |
| Overburden | - | 0.00 | g |
| Height of water | 4.11 | 3.27 | cm |
| Primary Swell | - | 1.2% | % |
| Ultimate Swell | - | 16.2% | % |
| Volume | 23.07 | 23.36 | cm³ |
| Change in | - | 0.28 | cm³ |
| Mass of water | - | 6.13 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary | -0.28% | %/log cycle | Primary Swell | 1.22% | Stress (psf) | 1430.0 |
| Slope of Secondary | 24.96% | %/log cycle | Time to Swell | 21.10 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/5/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

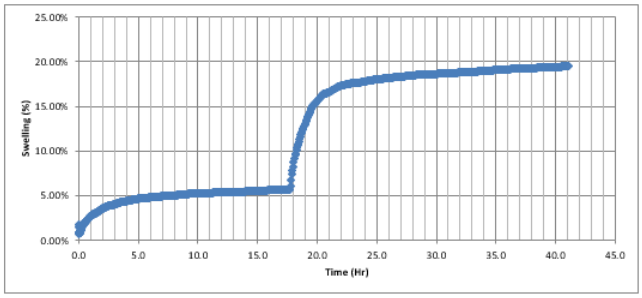
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 6-8' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.32 | g |
| Dry Unit Weight | 14.54 | kN/m$^3$ |
| Height of Sample | 11.593 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.43 | g's |
| Sample Height | - | 6.390 | mm |
| Testing Height | 11.342 | 11.907 | mm |
| Void Ratio, e | 0.822 | 0.912 | - |
| Moisture content, | 27.1% | 46.5% | - |
| Degree of Saturation | 89.2% | 100.0% | - |
| Change in $\omega$ | - | 19.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.33 | cm |
| Primary Swell | - | 5.0% | % |
| Ultimate Swell | - | 19.5% | % |
| Volume | 22.99 | 24.13 | cm$^3$ |
| Change in Volume | - | 1.14 | cm$^3$ |
| Mass of Water Lost | - | 4.99 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.77% | %/log cycle | Primary Swell | 4.98% | Stress (psf) | 342.6 |
| Slope of Secondary | 1.61% | %/log cycle | Time to Swell (hr) | 6.33 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/5/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

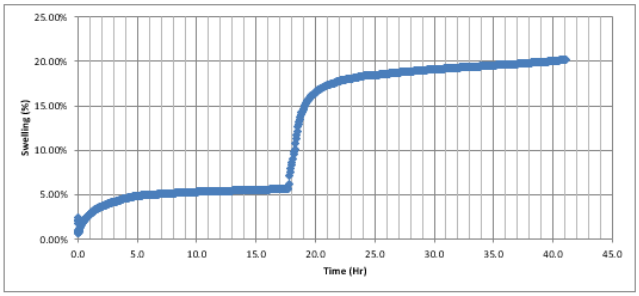
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 6-8' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.69 | g |
| Dry Unit Weight | 14.55 | kN/m$^3$ |
| Height of Sample | 11.346 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.23 | g's |
| Sample Height | - | 3.467 | mm |
| Testing Height | 11.178 | 11.749 | mm |
| Void Ratio, e | 0.820 | 0.913 | - |
| Moisture content, | 27.0% | 47.2% | - |
| Degree of Saturation | 88.9% | 100.0% | - |
| Change in $\omega$ | - | 20.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.10 | 3.24 | cm |
| Primary Swell | - | 5.1% | % |
| Ultimate Swell | - | 20.2% | % |
| Volume | 22.66 | 23.81 | cm$^3$ |
| Change in Volume | - | 1.16 | cm$^3$ |
| Mass of Water Lost | - | 3.11 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.86% | %/log cycle | Primary Swell | 5.10% | Stress (psf) | 339.2 |
| Slope of Secondary | 1.10% | %/log cycle | Time to Swell (hr) | 5.84 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducte | 2/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | Shivangi |

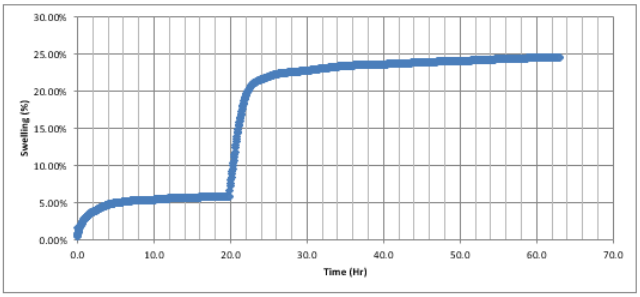
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 6-8' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.35 | g |
| Dry Unit Weight | 14.47 | kN/m$^3$ |
| Height of Sample | 11.405 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 75.59 | g's |
| Sample Height | - | 3.791 | mm |
| Testing Height | 11.339 | 11.925 | mm |
| Void Ratio, e | 0.830 | 0.925 | - |
| Moisture content, | 27.9% | 49.9% | - |
| Degree of Saturation | 90.6% | 100.0% | - |
| Change in ω | - | 22.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 2.99 | cm |
| Primary Swell | - | 5.2% | % |
| Ultimate Swell | - | 24.5% | % |
| Volume | 22.98 | 24.17 | cm$^3$ |
| Change in Volume | - | 1.19 | cm$^3$ |
| Mass of Water Lost | - | 10.00 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.65% | %/log cycle | Primary Swell | 5.17% | Stress (psf) | 741.5 |
| Slope of Secondary | 1.52% | %/log cycle | Time to Swell (hr) | 6.22 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducte | 2/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | Shivangi |

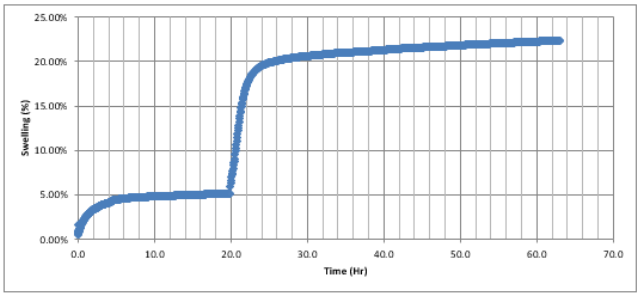
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 6-8' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.01 | g |
| Dry Unit Weight | 14.40 | kN/m$^3$ |
| Height of Sample | 11.674 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 75.59 | g's |
| Sample Height | - | 4.906 | mm |
| Testing Height | 11.583 | 12.132 | mm |
| Void Ratio, e | 0.839 | 0.926 | - |
| Moisture content, | 27.7% | 48.3% | - |
| Degree of Saturation | 89.1% | 100.0% | - |
| Change in ω | - | 20.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.17 | cm |
| Primary Swell | - | 4.7% | % |
| Ultimate Swell | - | 22.2% | % |
| Volume | 23.48 | 24.59 | cm$^3$ |
| Change in Volume | - | 1.11 | cm$^3$ |
| Mass of Water Lost | - | 6.19 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.35% | %/log cycle | Primary Swell | 4.74% | Stress (psf) | 734.7 |
| Slope of Secondary | 1.01% | %/log cycle | Time to Swell (hr) | 7.36 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducte | 2/6/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | Shivangi |

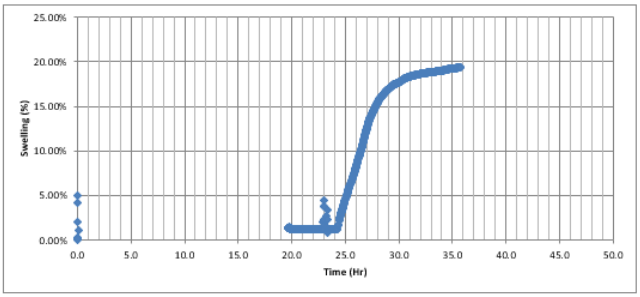
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 6-8' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.34 | g |
| Dry Unit Weight | 14.23 | kN/m$^3$ |
| Height of Sample | 11.664 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 90.36 | g's |
| Sample Height | - | 9.895 | mm |
| Testing Height | 11.664 | 11.814 | mm |
| Void Ratio, e | 0.861 | 0.885 | - |
| Moisture content, | 26.4% | 47.3% | - |
| Degree of Saturation | 82.7% | 100.0% | - |
| Change in ω | - | 21.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 2.91 | cm |
| Primary Swell | - | 1.3% | % |
| Ultimate Swell | - | 19.4% | % |
| Volume | 23.64 | 23.95 | cm$^3$ |
| Change in Volume | - | 0.30 | cm$^3$ |
| Mass of Water Lost | - | 8.28 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.28% | %/log cycle | Primary Swell | 1.29% | Stress (psf) | 1400.8 |
| Slope of Secondary | -0.09% | %/log cycle | Time to Swell (hr) | 21.25 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducte | 2/6/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | Shivangi |

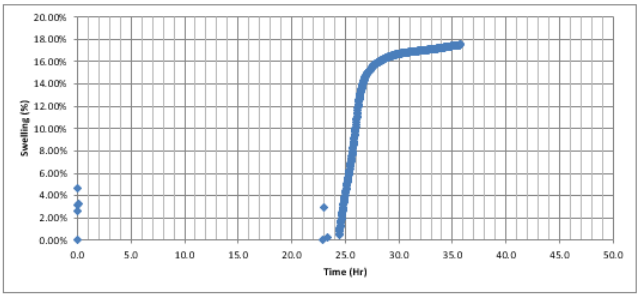
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 6-8' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.11 | g |
| Dry Unit Weight | 13.94 | kN/m$^3$ |
| Height of Sample | 11.333 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 91.56 | g's |
| Sample Height | - | 7.439 | mm |
| Testing Height | 11.333 | 11.251 | mm |
| Void Ratio, e | 0.900 | 0.886 | - |
| Moisture content, | 29.0% | 50.5% | - |
| Degree of Saturation | 87.0% | 100.0% | - |
| Change in ω | - | 21.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.22 | cm |
| Primary Swell | - | -0.7% | % |
| Ultimate Swell | - | 17.5% | % |
| Volume | 22.97 | 22.80 | cm$^3$ |
| Change in Volume | - | -0.17 | cm$^3$ |
| Mass of Water Lost | - | 7.23 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.00% | %/log cycle | Primary Swell | -0.73% | Stress (psf) | 1431.3 |
| Slope of Secondary | -107.26% | %/log cycle | Time to Swell (hr) | 21.11 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducte | 2/5/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

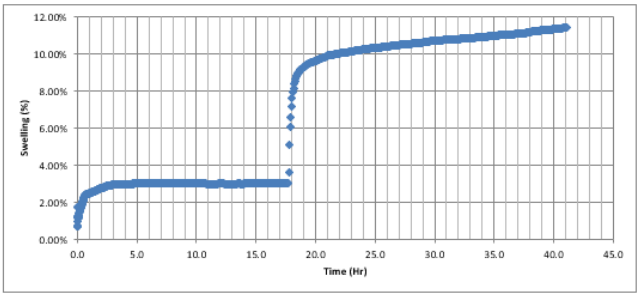
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.52 | g |
| Dry Unit Weight | 13.32 | kN/m$^3$ |
| Height of Sample | 11.699 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.42 | g's |
| Sample Height | - | 5.609 | mm |
| Testing Height | 11.510 | 11.865 | mm |
| Void Ratio, e | 0.988 | 1.050 | - |
| Moisture content, | 27.9% | 44.9% | - |
| Degree of Saturation | 76.2% | 99.9% | - |
| Change in ω | - | 17.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.33 | cm |
| Primary Swell | - | 3.1% | % |
| Ultimate Swell | - | 11.4% | % |
| Volume | 23.33 | 24.05 | cm$^3$ |
| Change in Volume | - | 0.72 | cm$^3$ |
| Mass of water Lost | - | 6.26 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.15% | %/log cycle |
| Primary Swell | 3.09% | |
| Stress (psf) | 334.0 | |
| Slope of Secondary | -0.08% | %/log cycle |
| Time to Swell (hr) | 3.58 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/5/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

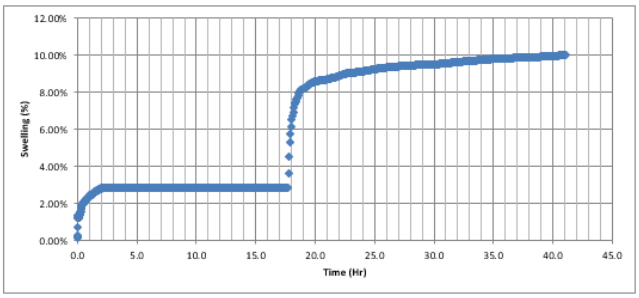
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.74 | g |
| Dry Unit Weight | 13.11 | kN/m$^3$ |
| Height of Sample | 11.664 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.07 | g's |
| Sample Height | - | 5.242 | mm |
| Testing Height | 11.505 | 11.836 | mm |
| Void Ratio, e | 1.021 | 1.079 | - |
| Moisture content, | 27.5% | 43.9% | - |
| Degree of Saturation | 72.8% | 97.0% | - |
| Change in ω | - | 16.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.22 | cm |
| Primary Swell | - | 2.9% | % |
| Ultimate Swell | - | 10.0% | % |
| Volume | 23.32 | 23.99 | cm$^3$ |
| Change in Volume | - | 0.67 | cm$^3$ |
| Mass of Water Lost | - | 4.12 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.25% | %/log cycle | Primary Swell | 2.88% | Stress (psf) 327.8 |
| Slope of Secondary | 0.00% | %/log cycle | Time to Swell (hr) | 2.23 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Shivangi |

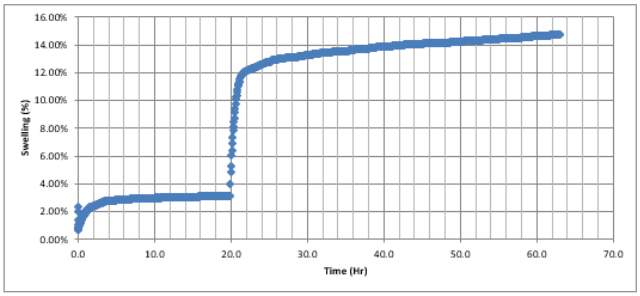
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.75 | g |
| Dry Unit Weight | 14.82 | kN/m$^3$ |
| Height of Sample | 11.394 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 74.89 | g's |
| Sample Height | - | 4.342 | mm |
| Testing Height | 11.323 | 11.656 | mm |
| Void Ratio, e | 0.788 | 0.840 | - |
| Moisture content, | 26.2% | 41.6% | - |
| Degree of Saturation | 89.9% | 100.0% | - |
| Change in ω | - | 15.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.74 | cm |
| Primary Swell | - | 2.9% | % |
| Ultimate Swell | - | 14.5% | % |
| Volume | 22.95 | 23.63 | cm$^3$ |
| Change in Volume | - | 0.68 | cm$^3$ |
| Mass of Water Lost | - | 7.89 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.21% | %/log cycle | Primary Swell | 2.94% | Stress (psf) 726.2 |
| Slope of Secondary | 0.46% | %/log cycle | Time to Swell (hr) | 7.50 | |

Specimen:

Centrifuge Swelling

| | |
|---|---|
| Date test conduct | 2/8/2013 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Shivangi |

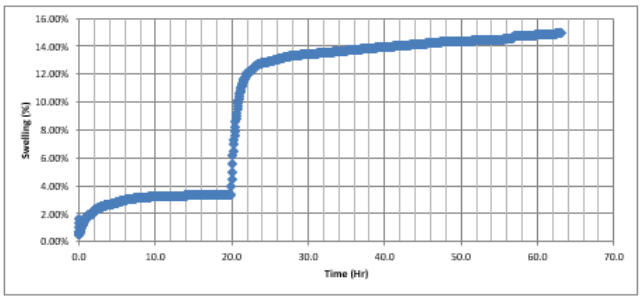
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 51.52 | g |
| Dry Unit Weight | 14.31 | kN/m³ |
| Height of Sample | 13.767 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 75.58 | g's |
| Sample Height | - | 6.134 | mm |
| Testing Height | 13.686 | 14.130 | mm |
| Void Ratio, e | 0.852 | 0.912 | - |
| Moisture | 27.4% | 43.7% | - |
| Degree of Saturation | 86.8% | 100.0% | - |
| Change in w | - | 16.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.66 | cm |
| Primary Swell | - | 3.2% | % |
| Ultimate Swell | - | 14.8% | % |
| Volume | 27.74 | 28.64 | cm³ |
| Change in Volume | - | 0.90 | cm³ |
| Mass of water Lost | - | 15.40 | g |

| NOTES | |
|---|---|




| | | |
|---|---|---|
| Slope of Primary | 1.48% | %/log cycle |
| Slope of Secondary | 0.26% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.24% |
| Time to Swell | 9.32 |

| | |
|---|---|
| Stress (psf) | 739.4 |

**Specimen:**

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/6/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | Shivangi |

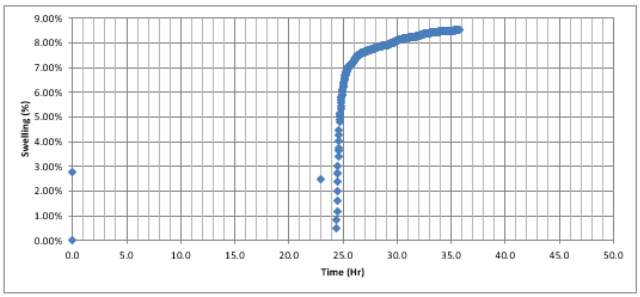
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.35 | g |
| Dry Unit Weight | 14.13 | kN/m$^3$ |
| Height of Sample | 11.389 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 88.92 | g's |
| Sample Height | - | 8.689 | mm |
| Testing Height | 11.389 | 11.092 | mm |
| Void Ratio, e | 0.874 | 0.825 | - |
| Moisture content, | 27.3% | 42.6% | - |
| Degree of Saturation | 84.4% | 100.0% | - |
| Change in ω | - | 15.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 2.61 | cm |
| Primary Swell | - | -2.6% | % |
| Ultimate Swell | - | 8.5% | % |
| Volume | 23.08 | 22.48 | cm$^3$ |
| Change in Volume | - | -0.60 | cm$^3$ |
| Mass of Water Lost | - | 8.24 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.85% | %/log cycle | Primary Swell | -2.61% | Stress (psf) | 1367.9 |
| Slope of Secondary | -32.15% | %/log cycle | Time to Swell (hr) | 21.11 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/6/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | Shivangi |

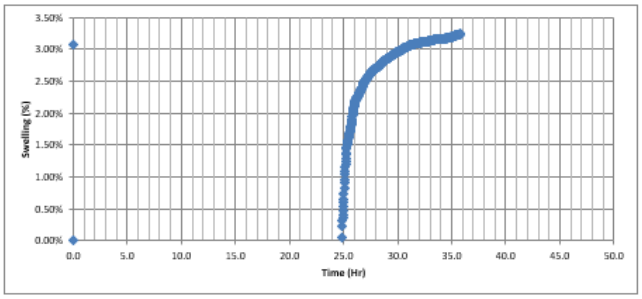
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | 1 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.18 | g |
| Dry Unit Weight | 12.91 | kN/m$^3$ |
| Height of Sample | 11.283 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.55 | g's |
| Sample Height | - | 7.914 | mm |
| Testing Height | 11.283 | 10.709 | mm |
| Void Ratio, e | 1.052 | 0.948 | - |
| Moisture | 26.9% | 43.0% | - |
| Degree of Saturation | 69.0% | 100.0% | - |
| Change in ω | - | 16.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.42 | cm |
| Primary Swell | - | -5.1% | % |
| Ultimate Swell | - | 3.2% | % |
| Volume | 22.87 | 21.70 | cm$^3$ |
| Change in Volume | - | -1.16 | cm$^3$ |
| Mass of Water Lost | - | 5.38 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary | -1.43% | %/log cycle | Primary Swell | -5.03% | Stress (psf) | 1421.2 |
| Slope of Secondary | -73.73% | %/log cycle | Time to Swell | 21.11 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | Shivangi |

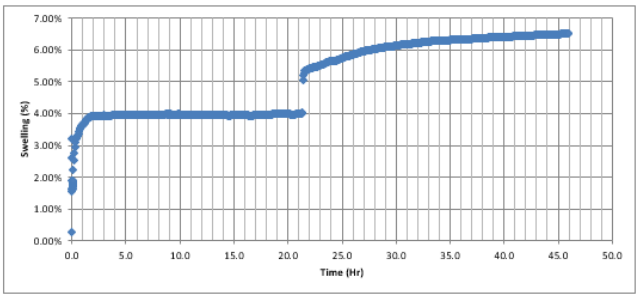
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B3 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.21 | g |
| Dry Unit Weight | 13.52 | kN/m$^3$ |
| Height of Sample | 10.841 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.19 | g's |
| Sample Height | - | 6.000 | mm |
| Testing Height | 10.819 | 11.247 | mm |
| Void Ratio, e | 0.960 | 1.037 | - |
| Moisture content, ω | 19.9% | 38.9% | - |
| Degree of Saturation | 55.9% | 96.6% | - |
| Change in ω | - | 19.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.19 | cm |
| Primary Swell | - | 4.0% | % |
| Ultimate Swell | - | 6.5% | % |
| Volume | 21.93 | 22.80 | cm$^3$ |
| Change in Volume | - | 0.87 | cm$^3$ |
| Mass of Water Lost | - | 8.77 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.65% | %/log cycle |
| Slope of Secondary | 0.01% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.96% |
| Time to Swell (hr) | 3.85 |

| | |
|---|---|
| Stress (psf) | 161.1 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | Shivangi |

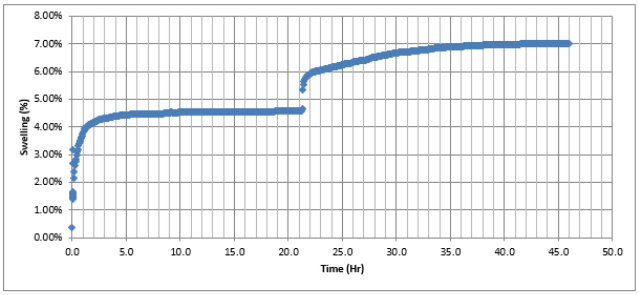
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B3 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.12 | g |
| Dry Unit Weight | 14.57 | kN/m$^3$ |
| Height of Sample | 10.643 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.27 | g's |
| Sample Height | - | 5.873 | mm |
| Testing Height | 10.616 | 11.084 | mm |
| Void Ratio, e | 0.818 | 0.898 | - |
| Moisture content, ω | 19.3% | 35.4% | - |
| Degree of Saturation | 63.7% | 100.0% | - |
| Change in ω | - | 16.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.43 | cm |
| Primary Swell | - | 4.4% | % |
| Ultimate Swell | - | 7.0% | % |
| Volume | 21.52 | 22.47 | cm$^3$ |
| Change in Volume | - | 0.95 | cm$^3$ |
| Mass of Water Lost | - | 5.42 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.27% | %/log cycle |
| Slope of Secondary Swelling | 0.21% | %/log cycle |

| | |
|---|---|
| Primary Swell | 4.40% |
| Time to Swell (hr) | 3.98 |

| | |
|---|---|
| Stress (psf) | 165.9 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | Shivangi |

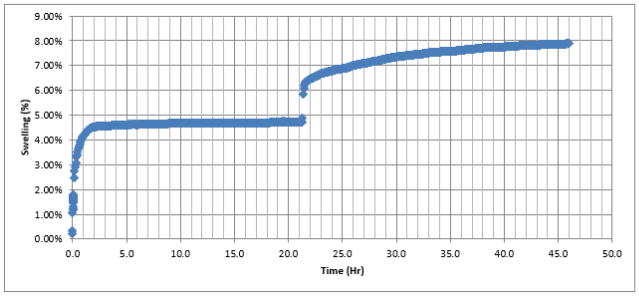
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B3 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.19 | g |
| Dry Unit Weight | 14.31 | kN/m$^3$ |
| Height of Sample | 10.424 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.31 | g's |
| Sample Height | - | 8.986 | mm |
| Testing Height | 10.378 | 10.855 | mm |
| Void Ratio, e | 0.851 | 0.936 | - |
| Moisture content, ω | 21.2% | 37.6% | - |
| Degree of Saturation | 67.2% | 100.0% | - |
| Change in ω | - | 16.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.22 | cm |
| Primary Swell | - | 4.6% | % |
| Ultimate Swell | - | 7.9% | % |
| Volume | 21.04 | 22.00 | cm$^3$ |
| Change in Volume | - | 0.97 | cm$^3$ |
| Mass of Water Lost | - | 5.30 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.08% | %/log cycle | Primary Swell | 4.59% | Stress (psf) | 251.3 |
| Slope of Secondary Swelling | 0.14% | %/log cycle | Time to Swell (hr) | 3.69 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | Shivangi |

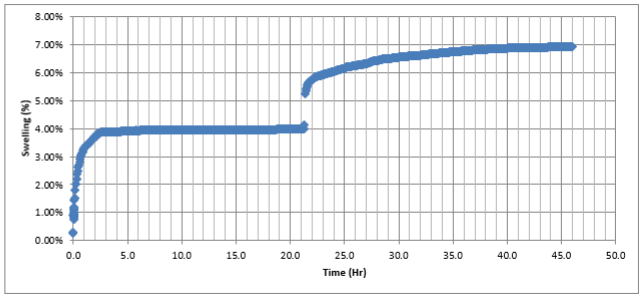
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B3 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.37 | g |
| Dry Unit Weight | 13.47 | kN/m$^3$ |
| Height of Sample | 10.683 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.42 | g's |
| Sample Height | - | 6.661 | mm |
| Testing Height | 10.652 | 11.066 | mm |
| Void Ratio, e | 0.967 | 1.043 | - |
| Moisture content, ω | 22.7% | 40.9% | - |
| Degree of Saturation | 63.4% | 100.0% | - |
| Change in ω | - | 18.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.38 | cm |
| Primary Swell | - | 3.9% | % |
| Ultimate Swell | - | 6.9% | % |
| Volume | 21.59 | 22.43 | cm$^3$ |
| Change in Volume | - | 0.84 | cm$^3$ |
| Mass of Water Lost | - | 6.61 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.29% | %/log cycle | Primary Swell | 3.89% | Stress (psf) | 252.7 |
| Slope of Secondary Swelling | 0.09% | %/log cycle | Time to Swell (hr) | 3.64 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | Shivangi |

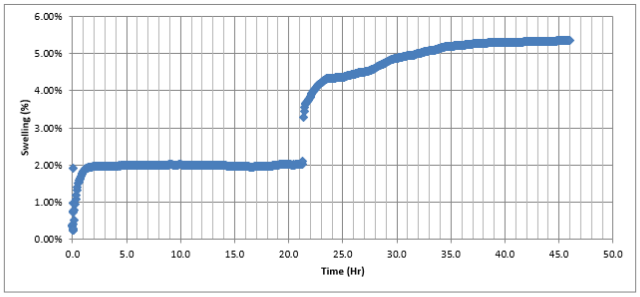
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B3 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.01 | g |
| Dry Unit Weight | 12.99 | kN/m$^3$ |
| Height of Sample | 10.592 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.10 | g's |
| Sample Height | - | 12.229 | mm |
| Testing Height | 10.564 | 10.774 | mm |
| Void Ratio, e | 1.039 | 1.080 | - |
| Moisture content, ω | 23.5% | 41.2% | - |
| Degree of Saturation | 61.0% | 96.9% | - |
| Change in ω | - | 17.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.22 | 2.96 | cm |
| Primary Swell | - | 2.0% | % |
| Ultimate Swell | - | 5.3% | % |
| Volume | 21.41 | 21.84 | cm$^3$ |
| Change in Volume | - | 0.42 | cm$^3$ |
| Mass of Water Lost | - | 3.96 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.50% | %/log cycle | Primary Swell | 1.98% | Stress (psf) | 405.2 |
| Slope of Secondary Swelling | -0.02% | %/log cycle | Time to Swell (hr) | 3.84 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | Shivangi |

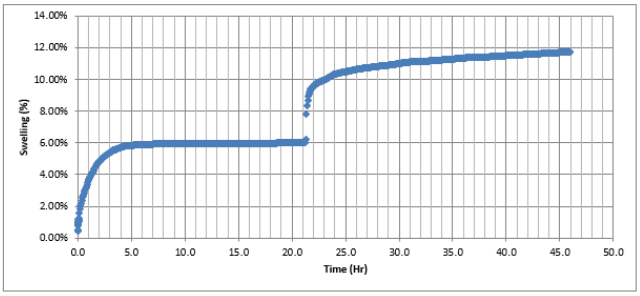
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B3 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.05 | g |
| Dry Unit Weight | 14.01 | kN/m$^3$ |
| Height of Sample | 10.602 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.43 | g's |
| Sample Height | - | 11.371 | mm |
| Testing Height | 10.567 | 11.179 | mm |
| Void Ratio, e | 0.891 | 1.001 | - |
| Moisture content, ω | 24.4% | 41.3% | - |
| Degree of Saturation | 74.0% | 100.0% | - |
| Change in ω | - | 16.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.50 | cm |
| Primary Swell | - | 5.8% | % |
| Ultimate Swell | - | 11.7% | % |
| Volume | 21.42 | 22.66 | cm$^3$ |
| Change in Volume | - | 1.24 | cm$^3$ |
| Mass of Water Lost | - | 3.33 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.55% | %/log cycle | Primary Swell | 5.79% | Stress (psf) | 419.8 |
| Slope of Secondary Swelling | 0.29% | %/log cycle | Time to Swell (hr) | 4.06 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Shivangi |

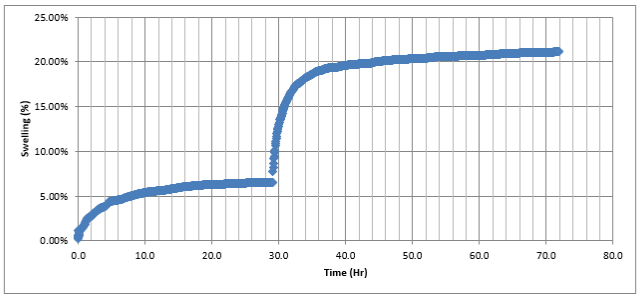
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.93 | g |
| Dry Unit Weight | 14.58 | kN/m$^3$ |
| Height of Sample | 10.384 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 34.35 | g's |
| Sample Height | - | 3.117 | mm |
| Testing Height | 10.343 | 10.961 | mm |
| Void Ratio, e | 0.817 | 0.926 | - |
| Moisture content, ω | 28.2% | 47.6% | - |
| Degree of Saturation | 93.1% | 100.0% | - |
| Change in ω | - | 19.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.18 | cm |
| Primary Swell | - | 6.0% | % |
| Ultimate Swell | - | 21.1% | % |
| Volume | 20.96 | 22.22 | cm$^3$ |
| Change in Volume | - | 1.25 | cm$^3$ |
| Mass of Water Lost | - | 10.79 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.34% | %/log cycle | Primary Swell | 5.97% | Stress (psf) 353.5 |
| Slope of Secondary Swelling | 2.36% | %/log cycle | Time to Swell (hr) | 15.36 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Shivangi |

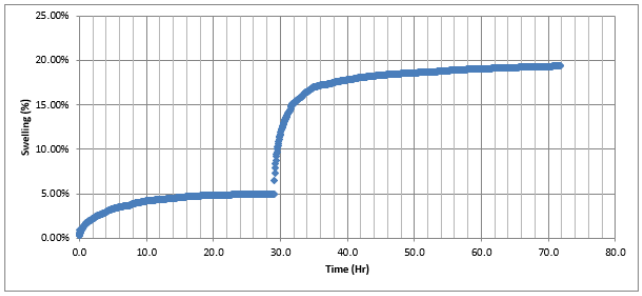
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.59 | g |
| Dry Unit Weight | 13.82 | kN/m$^3$ |
| Height of Sample | 10.526 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 34.05 | g's |
| Sample Height | - | 3.017 | mm |
| Testing Height | 10.478 | 10.950 | mm |
| Void Ratio, e | 0.917 | 1.004 | - |
| Moisture content, ω | 29.0% | 49.2% | - |
| Degree of Saturation | 85.4% | 100.0% | - |
| Change in ω | - | 20.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.02 | cm |
| Primary Swell | - | 4.5% | % |
| Ultimate Swell | - | 19.4% | % |
| Volume | 21.24 | 22.19 | cm$^3$ |
| Change in Volume | - | 0.96 | cm$^3$ |
| Mass of Water Lost | - | 9.42 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.42% | %/log cycle | Primary Swell | 4.50% | Stress (psf) 349.9 |
| Slope of Secondary Swelling | 1.60% | %/log cycle | Time to Swell (hr) | 13.57 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | Shivangi |

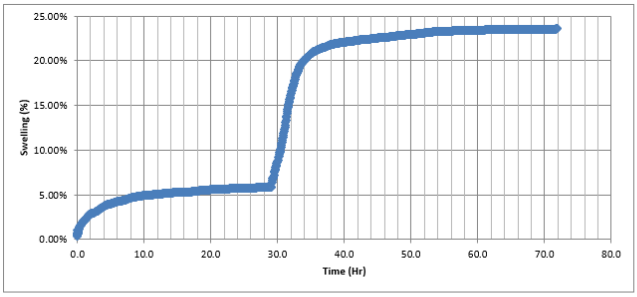
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.06 | g |
| Dry Unit Weight | 14.20 | kN/m$^3$ |
| Height of Sample | 10.561 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 34.72 | g's |
| Sample Height | - | 4.380 | mm |
| Testing Height | 10.521 | 11.069 | mm |
| Void Ratio, e | 0.865 | 0.962 | - |
| Moisture content, ω | 29.8% | 51.0% | - |
| Degree of Saturation | 92.9% | 100.0% | - |
| Change in ω | - | 21.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.21 | 3.03 | cm |
| Primary Swell | - | 5.2% | % |
| Ultimate Swell | - | 23.6% | % |
| Volume | 21.33 | 22.44 | cm$^3$ |
| Change in Volume | - | 1.11 | cm$^3$ |
| Mass of Water Lost | - | 12.55 | g |

NOTES




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.61% | %/log cycle | | Primary Swell | 5.21% | Stress (psf) | 539.0 |
| Slope of Secondary Swelling | 2.02% | %/log cycle | | Time to Swell (hr) | 13.58 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | Shivangi |

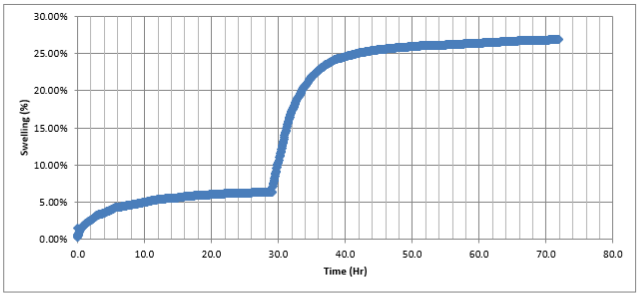
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.66 | g |
| Dry Unit Weight | 14.03 | kN/m$^3$ |
| Height of Sample | 10.490 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 34.72 | g's |
| Sample Height | - | 3.890 | mm |
| Testing Height | 10.450 | 11.009 | mm |
| Void Ratio, e | 0.888 | 0.989 | - |
| Moisture content, ω | 30.9% | 54.6% | - |
| Degree of Saturation | 94.1% | 100.0% | - |
| Change in ω | - | 23.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.24 | cm |
| Primary Swell | - | 5.3% | % |
| Ultimate Swell | - | 26.8% | % |
| Volume | 21.18 | 22.31 | cm$^3$ |
| Change in Volume | - | 1.13 | cm$^3$ |
| Mass of Water Lost | - | 6.10 | g |

NOTES




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.05% | %/log cycle | | Primary Swell | 5.35% | Stress (psf) | 542.6 |
| Slope of Secondary Swelling | 2.83% | %/log cycle | | Time to Swell (hr) | 11.85 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Shivangi |

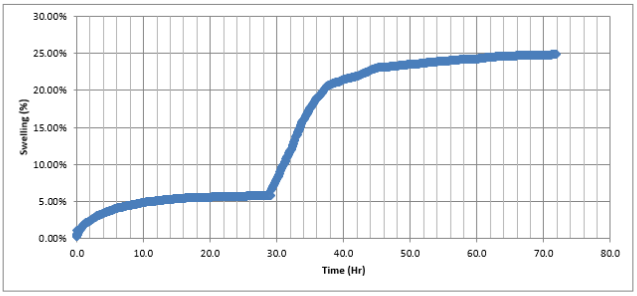
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.76 | g |
| Dry Unit Weight | 13.49 | kN/m$^3$ |
| Height of Sample | 10.785 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 34.73 | g's |
| Sample Height | - | 8.416 | mm |
| Testing Height | 10.726 | 11.307 | mm |
| Void Ratio, e | 0.964 | 1.070 | - |
| Moisture content, ω | 33.0% | 55.2% | - |
| Degree of Saturation | 92.5% | 100.0% | - |
| Change in ω | - | 22.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 2.51 | cm |
| Primary Swell | - | 5.4% | % |
| Ultimate Swell | - | 24.8% | % |
| Volume | 21.74 | 22.92 | cm$^3$ |
| Change in Volume | - | 1.18 | cm$^3$ |
| Mass of Water Lost | - | 19.91 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 2.94% | %/log cycle |
| Slope of Secondary Swelling | 1.50% | %/log cycle |

| | |
|---|---|
| Primary Swell | 5.42% |
| Time to Swell (hr) | 15.35 |

| | |
|---|---|
| Stress (psf) | 896.5 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Shivangi |

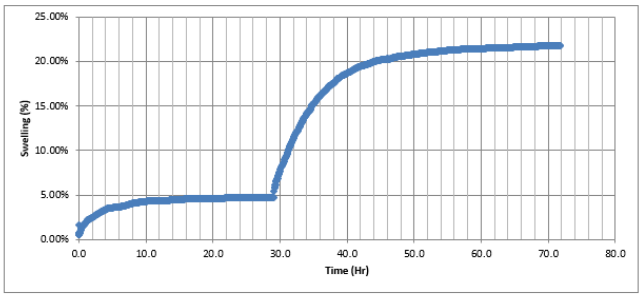
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.38 | g |
| Dry Unit Weight | 13.48 | kN/m$^3$ |
| Height of Sample | 10.505 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 34.38 | g's |
| Sample Height | - | 7.704 | mm |
| Testing Height | 10.442 | 10.908 | mm |
| Void Ratio, e | 0.964 | 1.052 | - |
| Moisture content, ω | 31.9% | 53.9% | - |
| Degree of Saturation | 89.4% | 100.0% | - |
| Change in ω | - | 22.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 2.59 | cm |
| Primary Swell | - | 4.5% | % |
| Ultimate Swell | - | 21.8% | % |
| Volume | 21.16 | 22.11 | cm$^3$ |
| Change in Volume | - | 0.94 | cm$^3$ |
| Mass of Water Lost | - | 13.84 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 2.26% | %/log cycle |
| Slope of Secondary Swelling | 0.76% | %/log cycle |

| | |
|---|---|
| Primary Swell | 4.46% |
| Time to Swell (hr) | 13.19 |

| | |
|---|---|
| Stress (psf) | 878.4 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

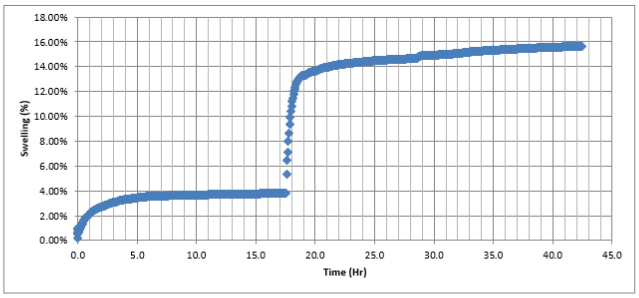
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.55 | g |
| Dry Unit Weight | 14.37 | kN/m$^3$ |
| Height of Sample | 10.902 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 43.54 | g's |
| Sample Height | - | 5.740 | mm |
| Testing Height | 10.840 | 11.225 | mm |
| Void Ratio, e | 0.843 | 0.909 | - |
| Moisture content, ω | 29.1% | 45.0% | - |
| Degree of Saturation | 93.2% | 100.0% | - |
| Change in ω | - | 15.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 2.95 | cm |
| Primary Swell | - | 3.6% | % |
| Ultimate Swell | - | 15.6% | % |
| Volume | 21.97 | 22.75 | cm$^3$ |
| Change in Volume | - | 0.78 | cm$^3$ |
| Mass of Water Lost | - | 12.87 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.38% | %/log cycle | Primary Swell | 3.55% | Stress (psf) 578.7 |
| Slope of Secondary Swelling | 0.48% | %/log cycle | Time to Swell (hr) | 6.05 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

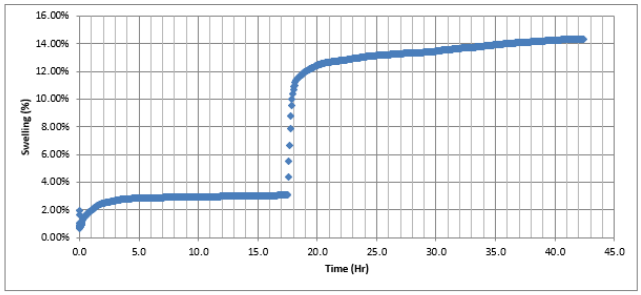
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.42 | g |
| Dry Unit Weight | 14.17 | kN/m$^3$ |
| Height of Sample | 11.049 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 43.54 | g's |
| Sample Height | - | 5.331 | mm |
| Testing Height | 10.984 | 11.295 | mm |
| Void Ratio, e | 0.869 | 0.922 | - |
| Moisture content, ω | 28.8% | 44.4% | - |
| Degree of Saturation | 89.5% | 100.0% | - |
| Change in ω | - | 15.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.93 | cm |
| Primary Swell | - | 2.8% | % |
| Ultimate Swell | - | 14.4% | % |
| Volume | 22.26 | 22.89 | cm$^3$ |
| Change in Volume | - | 0.63 | cm$^3$ |
| Mass of Water Lost | - | 10.31 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.07% | %/log cycle | Primary Swell | 2.83% | Stress (psf) 570.3 |
| Slope of Secondary Swelling | 0.34% | %/log cycle | Time to Swell (hr) | 4.57 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

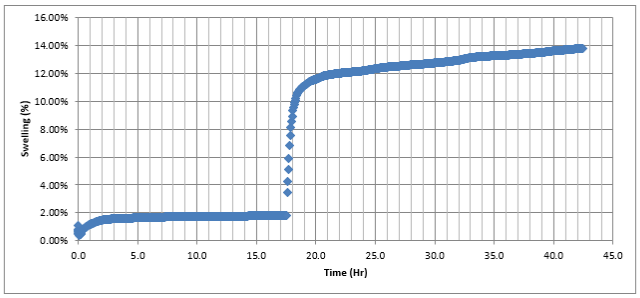
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.80 | g |
| Dry Unit Weight | 13.41 | kN/m$^3$ |
| Height of Sample | 10.841 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 43.40 | g's |
| Sample Height | - | 7.913 | mm |
| Testing Height | 10.754 | 10.933 | mm |
| Void Ratio, e | 0.975 | 1.008 | - |
| Moisture content, ω | 30.2% | 47.9% | - |
| Degree of Saturation | 83.7% | 100.0% | - |
| Change in ω | - | 17.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.11 | cm |
| Primary Swell | - | 1.7% | % |
| Ultimate Swell | - | 13.8% | % |
| Volume | 21.80 | 22.16 | cm$^3$ |
| Change in Volume | - | 0.36 | cm$^3$ |
| Mass of Water Lost | - | 8.24 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.63% | %/log cycle |
| Slope of Secondary Swelling | 0.24% | %/log cycle |

| | |
|---|---|
| Primary Swell | 1.67% |
| Time to Swell (hr) | 5.19 |

| | |
|---|---|
| Stress (psf) | 858.0 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

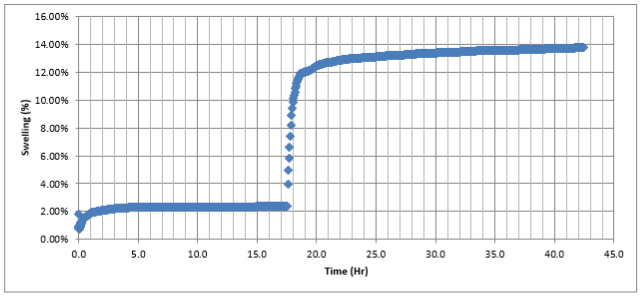
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.24 | g |
| Dry Unit Weight | 13.96 | kN/m$^3$ |
| Height of Sample | 11.135 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 43.88 | g's |
| Sample Height | - | 5.204 | mm |
| Testing Height | 11.066 | 11.321 | mm |
| Void Ratio, e | 0.898 | 0.941 | - |
| Moisture content, ω | 29.2% | 43.9% | - |
| Degree of Saturation | 87.9% | 100.0% | - |
| Change in ω | - | 14.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.43 | cm |
| Primary Swell | - | 2.3% | % |
| Ultimate Swell | - | 13.7% | % |
| Volume | 22.43 | 22.95 | cm$^3$ |
| Change in Volume | - | 0.52 | cm$^3$ |
| Mass of Water Lost | - | 6.38 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.75% | %/log cycle |
| Slope of Secondary Swelling | 0.08% | %/log cycle |

| | |
|---|---|
| Primary Swell | 2.31% |
| Time to Swell (hr) | 4.77 |

| | |
|---|---|
| Stress (psf) | 855.1 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

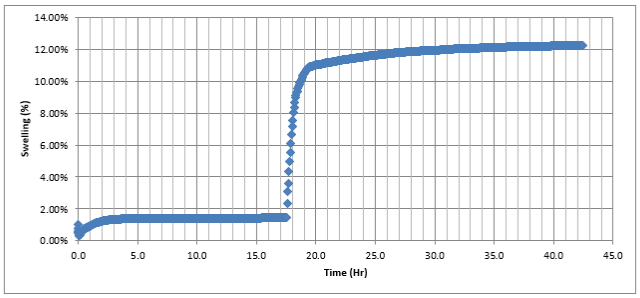
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.30 | g |
| Dry Unit Weight | 13.71 | kN/m$^3$ |
| Height of Sample | 10.886 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 43.68 | g's |
| Sample Height | - | 12.071 | mm |
| Testing Height | 10.804 | 10.958 | mm |
| Void Ratio, e | 0.932 | 0.959 | - |
| Moisture content, ω | 28.4% | 43.5% | - |
| Degree of Saturation | 82.3% | 100.0% | - |
| Change in ω | - | 15.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.23 | cm |
| Primary Swell | - | 1.4% | % |
| Ultimate Swell | - | 12.3% | % |
| Volume | 21.90 | 22.21 | cm$^3$ |
| Change in Volume | - | 0.31 | cm$^3$ |
| Mass of Water Lost | - | 9.92 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.52% | %/log cycle | Primary Swell | 1.42% | Stress (psf) | 1415.3 |
| Slope of Secondary Swelling | -0.02% | %/log cycle | Time to Swell (hr) | 5.11 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/19/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

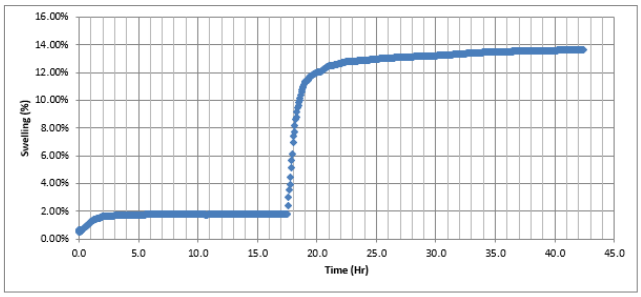
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B 3 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.45 | g |
| Dry Unit Weight | 13.89 | kN/m$^3$ |
| Height of Sample | 11.003 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 43.88 | g's |
| Sample Height | - | 12.161 | mm |
| Testing Height | 10.925 | 11.118 | mm |
| Void Ratio, e | 0.907 | 0.940 | - |
| Moisture content, ω | 29.0% | 44.5% | - |
| Degree of Saturation | 86.3% | 100.0% | - |
| Change in ω | - | 15.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.32 | cm |
| Primary Swell | - | 1.8% | % |
| Ultimate Swell | - | 13.7% | % |
| Volume | 22.14 | 22.53 | cm$^3$ |
| Change in Volume | - | 0.39 | cm$^3$ |
| Mass of Water Lost | - | 7.64 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.61% | %/log cycle | Primary Swell | 1.76% | Stress (psf) | 1443.4 |
| Slope of Secondary Swelling | 0.05% | %/log cycle | Time to Swell (hr) | 5.26 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | SJ |

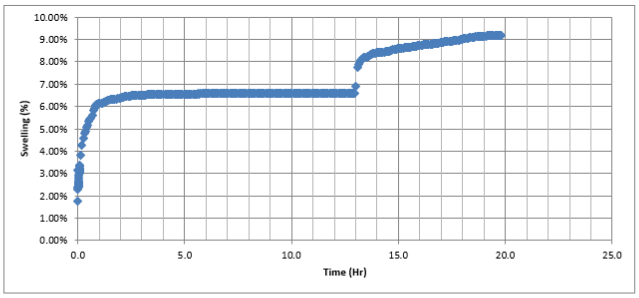
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.54 | g |
| Dry Unit Weight | 13.86 | kN/m$^3$ |
| Height of Sample | 10.668 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.86 | g's |
| Sample Height | - | 3.395 | mm |
| Testing Height | 10.657 | 11.354 | mm |
| Void Ratio, e | 0.911 | 1.036 | - |
| Moisture content, ω | 19.7% | 38.1% | - |
| Degree of Saturation | 58.5% | 94.8% | - |
| Change in ω | - | 18.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.51 | cm |
| Primary Swell | - | 6.5% | % |
| Ultimate Swell | - | 9.2% | % |
| Volume | 21.60 | 23.01 | cm$^3$ |
| Change in Volume | - | 1.41 | cm$^3$ |
| Mass of Water Lost | - | 3.41 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.07% | %/log cycle | Primary Swell | 6.54% | Stress (psf) | 149.9 |
| Slope of Secondary Swelling | 0.14% | %/log cycle | Time to Swell (hr) | 3.74 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | SJ |

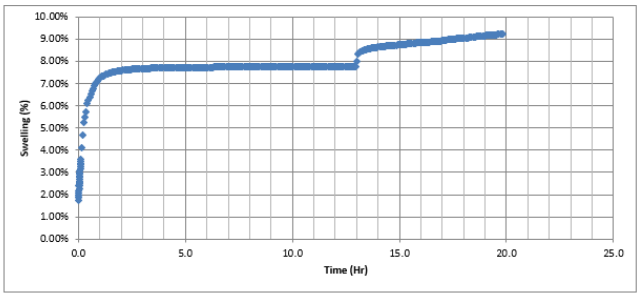
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.97 | g |
| Dry Unit Weight | 13.47 | kN/m$^3$ |
| Height of Sample | 10.856 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.68 | g's |
| Sample Height | - | 3.391 | mm |
| Testing Height | 10.844 | 11.679 | mm |
| Void Ratio, e | 0.967 | 1.118 | - |
| Moisture content, ω | 19.2% | 42.2% | - |
| Degree of Saturation | 53.7% | 99.2% | - |
| Change in ω | - | 23.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.10 | cm |
| Primary Swell | - | 7.7% | % |
| Ultimate Swell | - | 9.2% | % |
| Volume | 21.98 | 23.67 | cm$^3$ |
| Change in Volume | - | 1.69 | cm$^3$ |
| Mass of Water Lost | - | 2.44 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.74% | %/log cycle | Primary Swell | 7.70% | Stress (psf) | 148.1 |
| Slope of Secondary Swelling | 0.16% | %/log cycle | Time to Swell (hr) | 3.70 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | SJ |

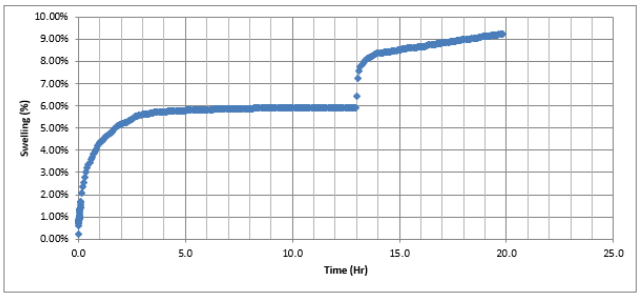
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.48 | g |
| Dry Unit Weight | 14.24 | kN/m$^3$ |
| Height of Sample | 10.907 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 17.04 | g's |
| Sample Height | - | 8.342 | mm |
| Testing Height | 10.901 | 11.526 | mm |
| Void Ratio, e | 0.860 | 0.967 | - |
| Moisture content, ω | 20.0% | 35.2% | - |
| Degree of Saturation | 62.7% | 92.2% | - |
| Change in ω | - | 15.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.14 | cm |
| Primary Swell | - | 5.7% | % |
| Ultimate Swell | - | 9.2% | % |
| Volume | 22.10 | 23.36 | cm$^3$ |
| Change in Volume | - | 1.27 | cm$^3$ |
| Mass of Water Lost | - | 6.08 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.51% | %/log cycle | Primary Swell | 5.73% | Stress (psf) 383.6 |
| Slope of Secondary Swelling | 0.44% | %/log cycle | Time to Swell (hr) | 3.77 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | SJ |

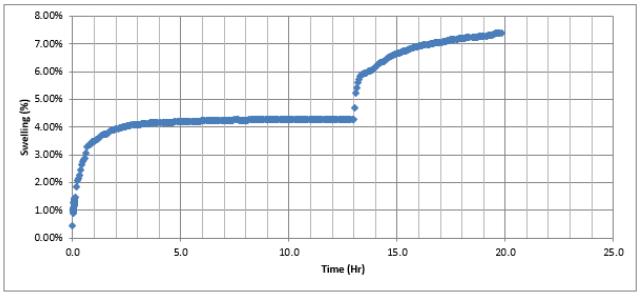
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.40 | g |
| Dry Unit Weight | 13.24 | kN/m$^3$ |
| Height of Sample | 10.800 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.91 | g's |
| Sample Height | - | 7.974 | mm |
| Testing Height | 10.795 | 11.244 | mm |
| Void Ratio, e | 1.000 | 1.083 | - |
| Moisture content, ω | 19.8% | 40.3% | - |
| Degree of Saturation | 53.6% | 94.8% | - |
| Change in ω | - | 20.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 2.89 | cm |
| Primary Swell | - | 4.2% | % |
| Ultimate Swell | - | 7.4% | % |
| Volume | 21.88 | 22.79 | cm$^3$ |
| Change in Volume | - | 0.91 | cm$^3$ |
| Mass of Water Lost | - | 6.17 | g |

NOTES Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.61% | %/log cycle | Primary Swell | 4.15% | Stress (psf) 378.5 |
| Slope of Secondary Swelling | 0.30% | %/log cycle | Time to Swell (hr) | 3.70 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 1/11/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | CRB |

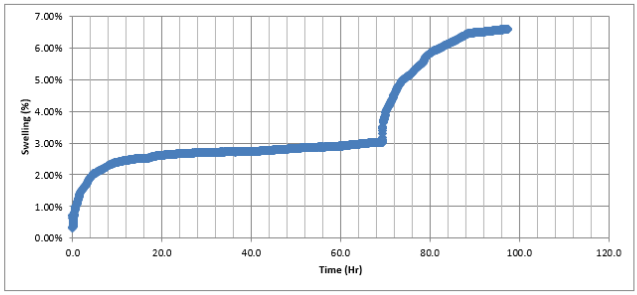
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | Tan CH | |
| Boring | B4 | |
| Depth | 6-8' (A) | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 65.03 | g |
| Dry Unit Weight | 15.51 | kN/m$^3$ |
| Height of Sample | 16.342 | mm |

TEST Results

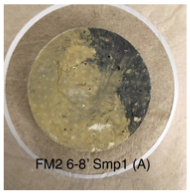
| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.95 | g's |
| Sample Height | - | 5.795 | mm |
| Testing Height | 16.278 | 16.715 | mm |
| Void Ratio, e | 0.708 | 0.754 | - |
| Moisture content, ω | 24.7% | 31.3% | - |
| Degree of Saturation | 94.2% | 100.0% | - |
| Change in ω | - | 6.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.04 | 2.78 | cm |
| Primary Swell | - | 2.7% | % |
| Ultimate Swell | - | 6.6% | % |
| Volume | 32.99 | 33.88 | cm$^3$ |
| Change in Volume | - | 0.89 | cm$^3$ |
| Mass of Water Lost | - | 16.44 | g |

NOTES: A material from (lower?) end of shelby tube




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.91% | %/log cycle | Primary Swell | 2.69% | Stress (psf) | 351.5 |
| Slope of Secondary Swelling | 0.21% | %/log cycle | Time to Swell (hr) | 24.41 | | |

Specimen:




Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 1/11/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | CRB |

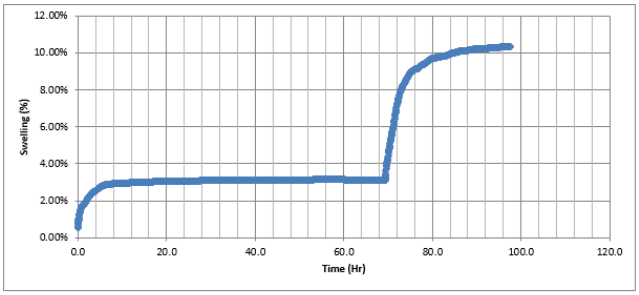
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | Tan CH | |
| Boring | B4 | |
| Depth | 6-8' (B) | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 62.23 | g |
| Dry Unit Weight | 14.97 | kN/m$^3$ |
| Height of Sample | 15.956 | mm |

TEST Results

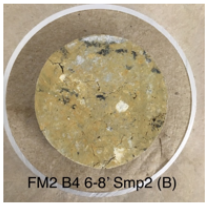
| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.54 | g's |
| Sample Height | - | 5.412 | mm |
| Testing Height | 15.887 | 16.372 | mm |
| Void Ratio, e | 0.770 | 0.824 | - |
| Moisture content, ω | 26.7% | 36.8% | - |
| Degree of Saturation | 93.5% | 100.0% | - |
| Change in ω | - | 10.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 3.98 | 1.76 | cm |
| Primary Swell | - | 3.1% | % |
| Ultimate Swell | - | 10.3% | % |
| Volume | 32.20 | 33.18 | cm$^3$ |
| Change in Volume | - | 0.98 | cm$^3$ |
| Mass of Water Lost | - | 33.92 | g |

NOTES: B material from (upper?) end of the shelby tube sample




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.09% | %/log cycle | Primary Swell | 3.05% | Stress (psf) | 341.3 |
| Slope of Secondary Swelling | 0.11% | %/log cycle | Time to Swell (hr) | 10.37 | | |

Specimen:



Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 1/11/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | CRB |

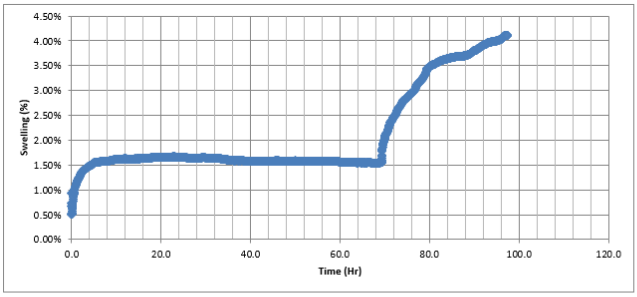
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | Tan CH w/ Gravel | |
| Boring | B4 | |
| Depth | 6-8' (A) | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 54.09 | g |
| Dry Unit Weight | 15.02 | $kN/m^3$ |
| Height of Sample | 13.990 | mm |

TEST Results

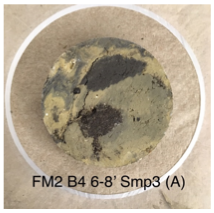
| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.75 | g's |
| Sample Height | - | 6.395 | mm |
| Testing Height | 13.904 | 14.134 | mm |
| Void Ratio, e | 0.763 | 0.793 | - |
| Moisture content, ω | 25.4% | 32.0% | - |
| Degree of Saturation | 89.7% | 100.0% | - |
| Change in ω | - | 6.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.59 | cm |
| Primary Swell | - | 1.7% | % |
| Ultimate Swell | - | 4.1% | % |
| Volume | 28.18 | 28.65 | $cm^3$ |
| Change in Volume | - | 0.47 | $cm^3$ |
| Mass of Water Lost | - | 23.09 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.53% | %/log cycle | Primary Swell | 1.65% | Stress (psf) 499.3 |
| Slope of Secondary Swelling | -0.09% | %/log cycle | Time to Swell (hr) | 8.48 | |

Specimen:




Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 1/11/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | CRB |

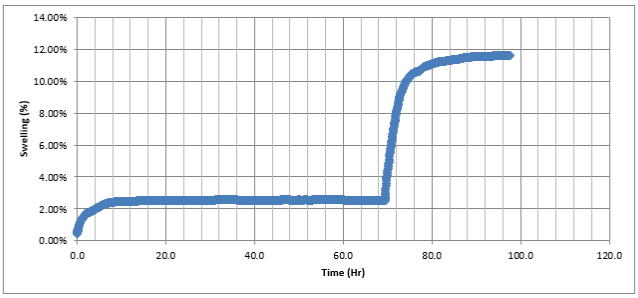
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | Tan CH | |
| Boring | B4 | |
| Depth | 6-8' (B) | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 58.45 | g |
| Dry Unit Weight | 15.23 | $kN/m^3$ |
| Height of Sample | 14.829 | mm |

TEST Results

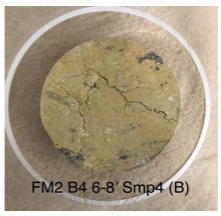
| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.00 | g's |
| Sample Height | - | 8.095 | mm |
| Testing Height | 14.744 | 15.127 | mm |
| Void Ratio, e | 0.739 | 0.785 | - |
| Moisture content, ω | 26.0% | 35.7% | - |
| Degree of Saturation | 94.9% | 100.0% | - |
| Change in ω | - | 9.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 2.70 | cm |
| Primary Swell | - | 2.6% | % |
| Ultimate Swell | - | 11.6% | % |
| Volume | 29.88 | 30.66 | $cm^3$ |
| Change in Volume | - | 0.78 | $cm^3$ |
| Mass of Water Lost | - | 22.57 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.90% | %/log cycle | Primary Swell | 2.60% | Stress (psf) 509.0 |
| Slope of Secondary Swelling | -0.15% | %/log cycle | Time to Swell (hr) | 17.29 | |

Specimen:



Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 1/11/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | CRB |

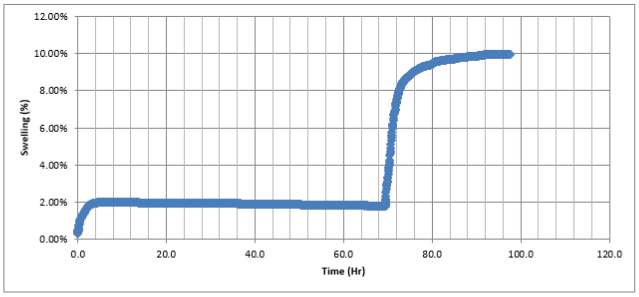
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | Tan CH | |
| Boring | B4 | |
| Depth | 6-8' (B) | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.92 | g |
| Dry Unit Weight | 14.95 | kN/m$^3$ |
| Height of Sample | 11.791 | mm |

TEST Results

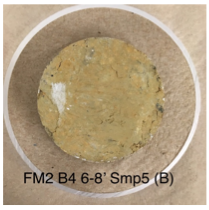
| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.00 | g's |
| Sample Height | - | 9.645 | mm |
| Testing Height | 11.737 | 11.977 | mm |
| Void Ratio, e | 0.771 | 0.808 | - |
| Moisture content, ω | 26.6% | 37.2% | - |
| Degree of Saturation | 93.3% | 100.0% | - |
| Change in ω | - | 10.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 2.60 | cm |
| Primary Swell | - | 2.0% | % |
| Ultimate Swell | - | 10.0% | % |
| Volume | 23.79 | 24.28 | cm$^3$ |
| Change in Volume | - | 0.49 | cm$^3$ |
| Mass of Water Lost | - | 26.34 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.93% | %/log cycle | Primary Swell | 2.05% | Stress (psf) | 824.4 |
| Slope of Secondary Swelling | -0.15% | %/log cycle | Time to Swell (hr) | 5.28 | | |

Specimen:




Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 1/11/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | CRB |

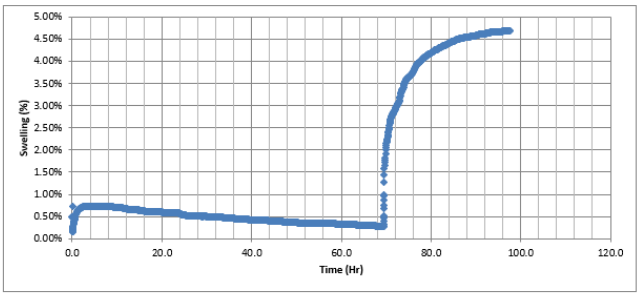
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | Tan CH w Gravel | |
| Boring | B4 | |
| Depth | 6-8' (A) | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.66 | g |
| Dry Unit Weight | 15.03 | kN/m$^3$ |
| Height of Sample | 12.365 | mm |

TEST Results

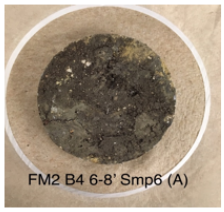
| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.57 | g's |
| Sample Height | - | 9.603 | mm |
| Testing Height | 12.295 | 12.335 | mm |
| Void Ratio, e | 0.762 | 0.768 | - |
| Moisture content, ω | 22.2% | 30.8% | - |
| Degree of Saturation | 78.7% | 98.4% | - |
| Change in ω | - | 8.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.91 | cm |
| Primary Swell | - | 0.3% | % |
| Ultimate Swell | - | 4.7% | % |
| Volume | 24.92 | 25.00 | cm$^3$ |
| Change in Volume | - | 0.08 | cm$^3$ |
| Mass of Water Lost | - | 10.79 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.03% | %/log cycle | Primary Swell | 0.32% | Stress (psf) | 801.0 |
| Slope of Secondary Swelling | -0.64% | %/log cycle | Time to Swell (hr) | 59.88 | | |

Specimen:



Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SJ |

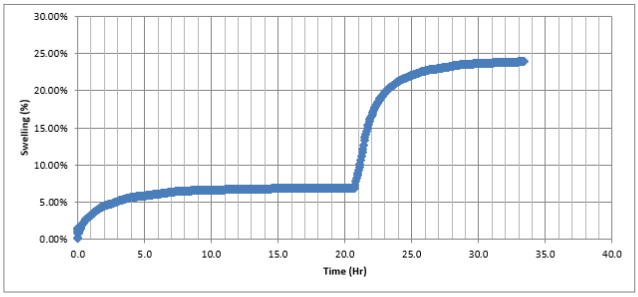
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.86 | g |
| Dry Unit Weight | 14.88 | $kN/m^3$ |
| Height of Sample | 10.866 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.50 | g's |
| Sample Height | - | 5.507 | mm |
| Testing Height | 10.819 | 11.528 | mm |
| Void Ratio, e | 0.780 | 0.897 | - |
| Moisture content, ω | 25.9% | 47.0% | - |
| Degree of Saturation | 89.5% | 100.0% | - |
| Change in ω | - | 21.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 2.87 | cm |
| Primary Swell | - | 6.6% | % |
| Ultimate Swell | - | 23.9% | % |
| Volume | 21.93 | 23.36 | $cm^3$ |
| Change in Volume | - | 1.44 | $cm^3$ |
| Mass of Water Lost | - | 11.83 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.74% | %/log cycle | Primary Swell | 6.55% | Stress (psf) 534.4 |
| Slope of Secondary Swelling | 1.05% | %/log cycle | Time to Swell (hr) | 8.25 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SJ |

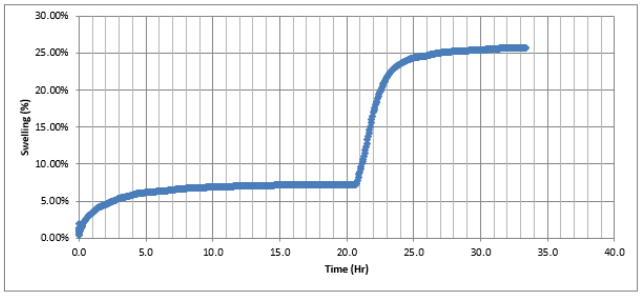
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.89 | g |
| Dry Unit Weight | 14.73 | $kN/m^3$ |
| Height of Sample | 10.831 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.77 | g's |
| Sample Height | - | 5.260 | mm |
| Testing Height | 10.782 | 11.515 | mm |
| Void Ratio, e | 0.798 | 0.920 | - |
| Moisture content, ω | 27.6% | 48.8% | - |
| Degree of Saturation | 93.5% | 100.0% | - |
| Change in ω | - | 21.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 2.63 | cm |
| Primary Swell | - | 6.8% | % |
| Ultimate Swell | - | 25.8% | % |
| Volume | 21.85 | 23.34 | $cm^3$ |
| Change in Volume | - | 1.49 | $cm^3$ |
| Mass of Water Lost | - | 17.69 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.85% | %/log cycle | Primary Swell | 6.80% | Stress (psf) 536.8 |
| Slope of Secondary Swelling | 1.42% | %/log cycle | Time to Swell (hr) | 8.59 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SJ |

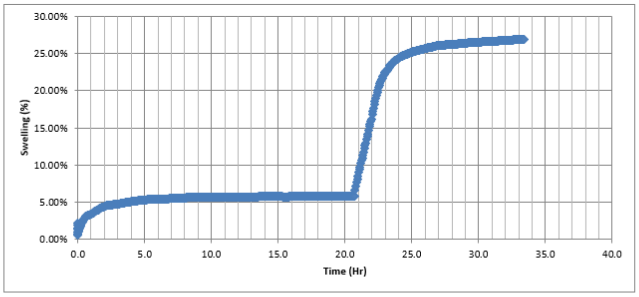
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.69 | g |
| Dry Unit Weight | 17.36 | $kN/m^3$ |
| Height of Sample | 9.322 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.94 | g's |
| Sample Height | - | 7.752 | mm |
| Testing Height | 9.272 | 9.795 | mm |
| Void Ratio, e | 0.526 | 0.612 | - |
| Moisture content, ω | 25.4% | 45.2% | - |
| Degree of Saturation | 100.0% | 100.0% | - |
| Change in ω | - | 19.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.21 | 3.16 | cm |
| Primary Swell | - | 5.6% | % |
| Ultimate Swell | - | 26.9% | % |
| Volume | 18.79 | 19.85 | $cm^3$ |
| Change in Volume | - | 1.06 | $cm^3$ |
| Mass of Water Lost | - | 11.64 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.18% | %/log cycle | Primary Swell | 5.64% | Stress (psf) | 790.4 |
| Slope of Secondary Swelling | 0.40% | %/log cycle | Time to Swell (hr) | 8.19 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SJ |

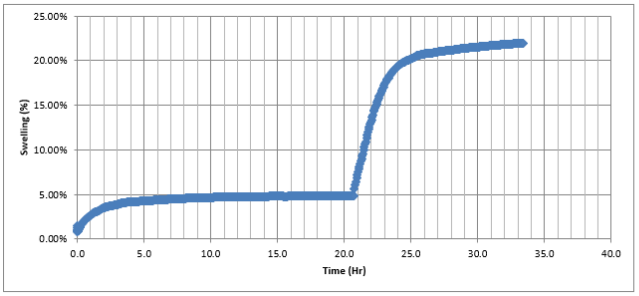
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.01 | g |
| Dry Unit Weight | 14.68 | $kN/m^3$ |
| Height of Sample | 10.698 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.77 | g's |
| Sample Height | - | 4.972 | mm |
| Testing Height | 10.635 | 11.122 | mm |
| Void Ratio, e | 0.805 | 0.887 | - |
| Moisture content, ω | 27.2% | 46.6% | - |
| Degree of Saturation | 91.2% | 100.0% | - |
| Change in ω | - | 19.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.27 | cm |
| Primary Swell | - | 4.6% | % |
| Ultimate Swell | - | 22.0% | % |
| Volume | 21.55 | 22.54 | $cm^3$ |
| Change in Volume | - | 0.99 | $cm^3$ |
| Mass of Water Lost | - | 7.94 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.82% | %/log cycle | Primary Swell | 4.59% | Stress (psf) | 800.7 |
| Slope of Secondary Swelling | 0.76% | %/log cycle | Time to Swell (hr) | 8.03 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SJ |

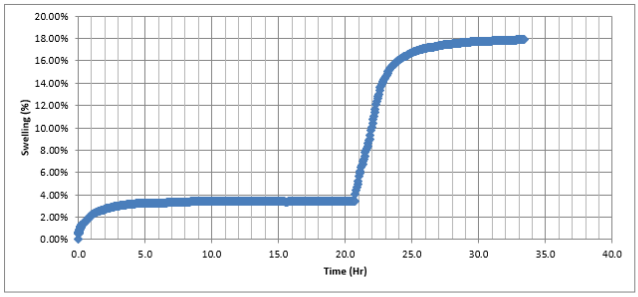
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.76 | g |
| Dry Unit Weight | 14.81 | $kN/m^3$ |
| Height of Sample | 10.917 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.78 | g's |
| Sample Height | - | 11.872 | mm |
| Testing Height | 10.863 | 11.233 | mm |
| Void Ratio, e | 0.788 | 0.849 | - |
| Moisture content, ω | 25.6% | 42.6% | - |
| Degree of Saturation | 87.7% | 100.0% | - |
| Change in ω | - | 17.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.03 | cm |
| Primary Swell | - | 3.4% | % |
| Ultimate Swell | - | 17.9% | % |
| Volume | 22.02 | 22.77 | $cm^3$ |
| Change in Volume | - | 0.75 | $cm^3$ |
| Mass of Water Lost | - | 13.98 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.32% | %/log cycle | Primary Swell | 3.40% | Stress (psf) | 1313.5 |
| Slope of Secondary Swelling | 0.13% | %/log cycle | Time to Swell (hr) | 8.45 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SJ |

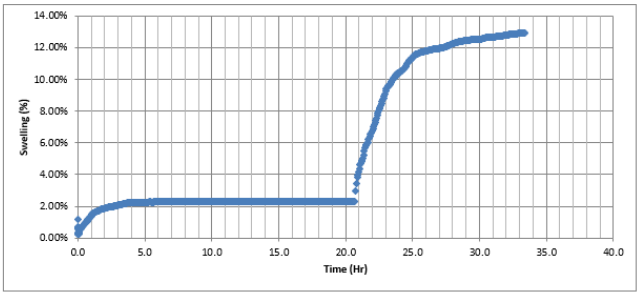
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B4 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.89 | g |
| Dry Unit Weight | 14.67 | $kN/m^3$ |
| Height of Sample | 10.719 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 52.25 | g's |
| Sample Height | - | 11.685 | mm |
| Testing Height | 10.670 | 10.917 | mm |
| Void Ratio, e | 0.806 | 0.847 | - |
| Moisture content, ω | 26.4% | 40.1% | - |
| Degree of Saturation | 88.6% | 100.0% | - |
| Change in ω | - | 13.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.03 | cm |
| Primary Swell | - | 2.3% | % |
| Ultimate Swell | - | 13.0% | % |
| Volume | 21.63 | 22.13 | $cm^3$ |
| Change in Volume | - | 0.50 | $cm^3$ |
| Mass of Water Lost | - | 10.30 | g |

**NOTES** Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.99% | %/log cycle | Primary Swell | 2.31% | Stress (psf) | 1293.8 |
| Slope of Secondary Swelling | 0.03% | %/log cycle | Time to Swell (hr) | 7.83 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | SJ |

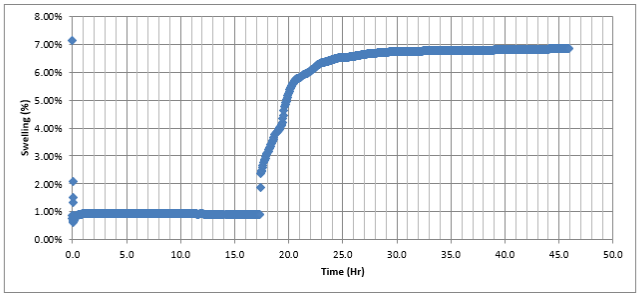
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | BS | |
| Depth | 8-10FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 47.50 | g |
| Dry Unit Weight | 17.67 | kN/m$^3$ |
| Height of Sample | 11.369 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 36.47 | g's |
| Sample Height | - | 3.950 | mm |
| Testing Height | 11.348 | 11.456 | mm |
| Void Ratio, e | 0.499 | 0.513 | - |
| Moisture content, ω | 14.6% | 22.5% | - |
| Degree of Saturation | 79.2% | 100.0% | - |
| Change in ω | - | 7.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.47 | cm |
| Primary Swell | - | 0.9% | % |
| Ultimate Swell | - | 6.8% | % |
| Volume | 23.00 | 23.22 | cm$^3$ |
| Change in Volume | - | 0.22 | cm$^3$ |
| Mass of Water Lost | - | 5.98 | g |

**NOTES**




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.13% | %/log cycle |
| Slope of Secondary Swelling | -0.11% | %/log cycle |

| | |
|---|---|
| Primary Swell | 0.95% |
| Time to Swell (hr) | 8.06 |

| | |
|---|---|
| Stress (psf) | 587.1 |

**Specimen:**

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SJ |

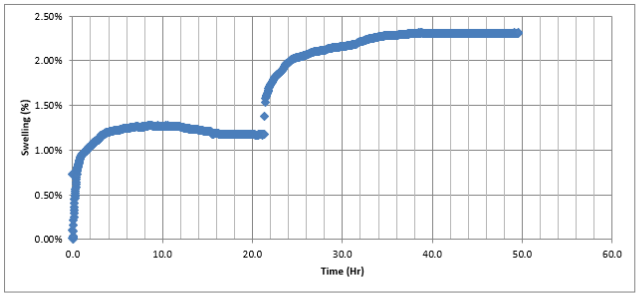
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.16 | g |
| Dry Unit Weight | 14.90 | kN/m$^3$ |
| Height of Sample | 11.491 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.24 | g's |
| Sample Height | - | 6.221 | mm |
| Testing Height | 11.479 | 11.626 | mm |
| Void Ratio, e | 0.778 | 0.801 | - |
| Moisture content, ω | 25.0% | 31.1% | - |
| Degree of Saturation | 86.7% | 100.0% | - |
| Change in ω | - | 6.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.04 | 3.27 | cm |
| Primary Swell | - | 1.3% | % |
| Ultimate Swell | - | 2.3% | % |
| Volume | 23.27 | 23.56 | cm$^3$ |
| Change in Volume | - | 0.30 | cm$^3$ |
| Mass of Water Lost | - | 5.69 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.61% | %/log cycle | Primary Swell | 1.28% | Stress (psf) | 159.7 |
| Slope of Secondary Swelling | -0.20% | %/log cycle | Time to Swell (hr) | 5.79 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SJ |

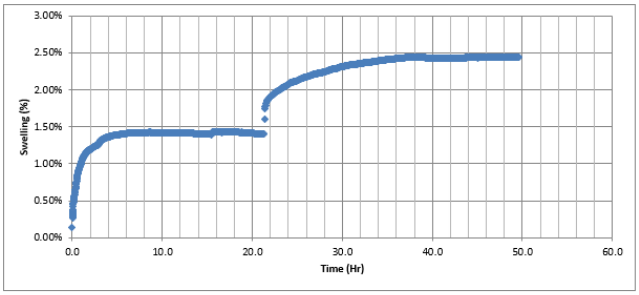
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | 0 | |
| Boring | 0 | |
| Depth | 0 | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.54 | g |
| Dry Unit Weight | 15.29 | kN/m$^3$ |
| Height of Sample | 11.273 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.18 | g's |
| Sample Height | - | 5.871 | mm |
| Testing Height | 11.242 | 11.401 | mm |
| Void Ratio, e | 0.733 | 0.757 | - |
| Moisture content, ω | 25.4% | 30.3% | - |
| Degree of Saturation | 93.7% | 100.0% | - |
| Change in ω | - | 4.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.25 | cm |
| Primary Swell | - | 1.4% | % |
| Ultimate Swell | - | 2.5% | % |
| Volume | 22.79 | 23.11 | cm$^3$ |
| Change in Volume | - | 0.32 | cm$^3$ |
| Mass of Water Lost | - | 5.95 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.52% | %/log cycle | Primary Swell | 1.41% | Stress (psf) | 156.9 |
| Slope of Secondary Swelling | 0.03% | %/log cycle | Time to Swell (hr) | 5.04 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SJ |

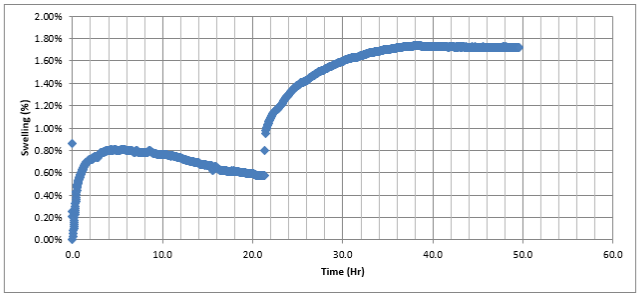
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | 0 | |
| Boring | 0 | |
| Depth | 0 | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.16 | g |
| Dry Unit Weight | 15.31 | kN/m$^3$ |
| Height of Sample | 11.110 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.09 | g's |
| Sample Height | - | 8.350 | mm |
| Testing Height | 11.105 | 11.198 | mm |
| Void Ratio, e | 0.730 | 0.744 | - |
| Moisture content, ω | 22.9% | 28.1% | - |
| Degree of Saturation | 84.6% | 99.9% | - |
| Change in ω | - | 5.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.58 | cm |
| Primary Swell | - | 0.8% | % |
| Ultimate Swell | - | 1.7% | % |
| Volume | 22.51 | 22.70 | cm$^3$ |
| Change in Volume | - | 0.19 | cm$^3$ |
| Mass of Water Lost | - | 4.24 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.42% | %/log cycle | Primary Swell | 0.84% | Stress (psf) | 237.3 |
| Slope of Secondary Swelling | -0.44% | %/log cycle | Time to Swell (hr) | 5.46 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SJ |

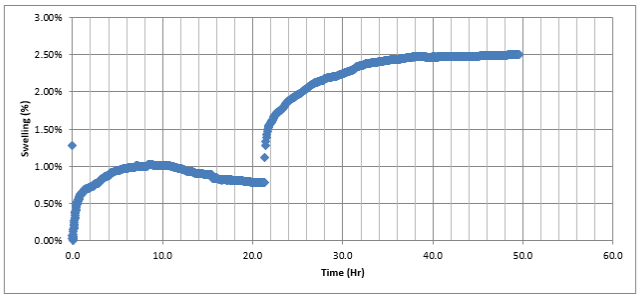
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | 0 | |
| Boring | 0 | |
| Depth | 0 | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.21 | g |
| Dry Unit Weight | 14.26 | kN/m$^3$ |
| Height of Sample | 10.820 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.25 | g's |
| Sample Height | - | 5.253 | mm |
| Testing Height | 10.800 | 10.906 | mm |
| Void Ratio, e | 0.857 | 0.875 | - |
| Moisture content, ω | 23.2% | 32.9% | - |
| Degree of Saturation | 73.1% | 98.4% | - |
| Change in ω | - | 9.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.26 | cm |
| Primary Swell | - | 1.0% | % |
| Ultimate Swell | - | 2.5% | % |
| Volume | 21.89 | 22.10 | cm$^3$ |
| Change in Volume | - | 0.22 | cm$^3$ |
| Mass of Water Lost | - | 2.84 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.44% | %/log cycle | Primary Swell | 0.98% | Stress (psf) | 236.1 |
| Slope of Secondary Swelling | -0.27% | %/log cycle | Time to Swell (hr) | 6.90 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SJ |

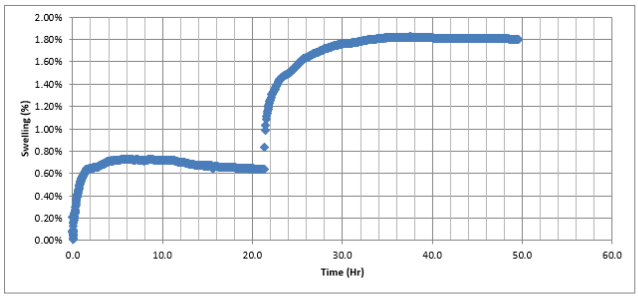
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | 0 | |
| Boring | 0 | |
| Depth | 0 | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.44 | g |
| Dry Unit Weight | 15.06 | kN/m$^3$ |
| Height of Sample | 11.252 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.25 | g's |
| Sample Height | - | 12.529 | mm |
| Testing Height | 11.251 | 11.334 | mm |
| Void Ratio, e | 0.759 | 0.772 | - |
| Moisture content, ω | 24.1% | 29.9% | - |
| Degree of Saturation | 85.8% | 100.0% | - |
| Change in ω | - | 5.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.05 | 3.34 | cm |
| Primary Swell | - | 0.7% | % |
| Ultimate Swell | - | 1.8% | % |
| Volume | 22.80 | 22.97 | cm$^3$ |
| Change in Volume | - | 0.17 | cm$^3$ |
| Mass of Water Lost | - | 7.42 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.32% | %/log cycle | Primary Swell | 0.74% | Stress (psf) | 397.4 |
| Slope of Secondary Swelling | -0.17% | %/log cycle | Time to Swell (hr) | 5.49 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SJ |

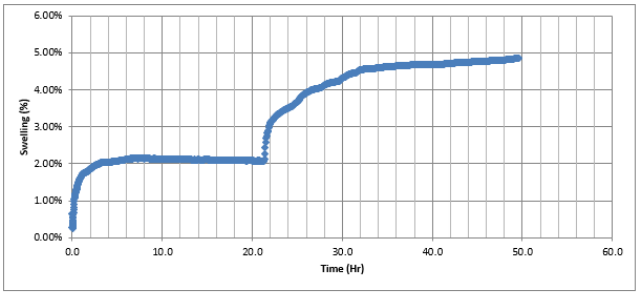
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | 0 | |
| Boring | 0 | |
| Depth | 0 | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.20 | g |
| Dry Unit Weight | 15.00 | kN/m$^3$ |
| Height of Sample | 11.359 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.11 | g's |
| Sample Height | - | 12.521 | mm |
| Testing Height | 11.351 | 11.595 | mm |
| Void Ratio, e | 0.766 | 0.804 | - |
| Moisture content, ω | 22.8% | 31.2% | - |
| Degree of Saturation | 80.4% | 99.0% | - |
| Change in ω | - | 8.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.10 | 3.35 | cm |
| Primary Swell | - | 2.2% | % |
| Ultimate Swell | - | 4.9% | % |
| Volume | 23.01 | 23.50 | cm$^3$ |
| Change in Volume | - | 0.50 | cm$^3$ |
| Mass of Water Lost | - | 2.72 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.86% | %/log cycle | Primary Swell | 2.15% | Stress (psf) | 398.6 |
| Slope of Secondary Swelling | -0.11% | %/log cycle | Time to Swell (hr) | 5.81 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | SJ |

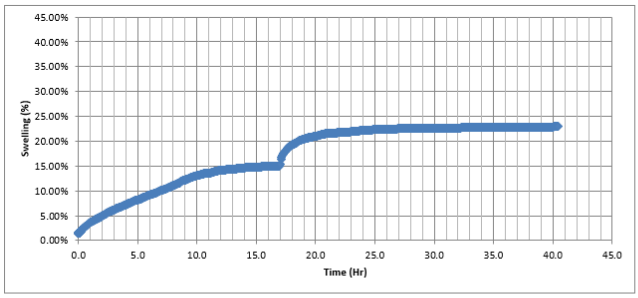
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.54 | g |
| Dry Unit Weight | 16.64 | kN/m$^3$ |
| Height of Sample | 10.902 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 15.89 | g's |
| Sample Height | - | 6.156 | mm |
| Testing Height | 10.890 | 12.469 | mm |
| Void Ratio, e | 0.592 | 0.823 | - |
| Moisture content, ω | 19.0% | 37.2% | - |
| Degree of Saturation | 86.6% | 100.0% | - |
| Change in ω | - | 18.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.48 | cm |
| Primary Swell | - | 14.5% | % |
| Ultimate Swell | - | 22.9% | % |
| Volume | 22.07 | 25.27 | cm$^3$ |
| Change in Volume | - | 3.20 | cm$^3$ |
| Mass of Water Lost | - | 2.35 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 15.56% | %/log cycle | Primary Swell | 14.50% | Stress (psf) | 224.7 |
| Slope of Secondary Swelling | 3.91% | %/log cycle | Time to Swell (hr) | 12.34 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | SJ |

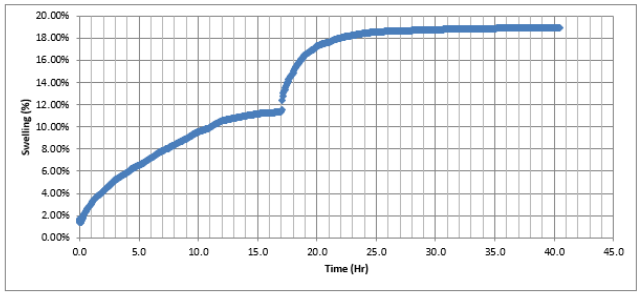
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.29 | g |
| Dry Unit Weight | 16.34 | kN/m$^3$ |
| Height of Sample | 11.308 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 15.88 | g's |
| Sample Height | - | 6.341 | mm |
| Testing Height | 11.313 | 12.572 | mm |
| Void Ratio, e | 0.621 | 0.801 | - |
| Moisture content, ω | 18.6% | 35.4% | - |
| Degree of Saturation | 80.7% | 100.0% | - |
| Change in ω | - | 16.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.40 | cm |
| Primary Swell | - | 11.1% | % |
| Ultimate Swell | - | 19.0% | % |
| Volume | 22.93 | 25.48 | cm$^3$ |
| Change in Volume | - | 2.55 | cm$^3$ |
| Mass of Water Lost | - | 3.09 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 9.57% | %/log cycle | Primary Swell | 11.13% | Stress (psf) | 223.4 |
| Slope of Secondary Swelling | 3.53% | %/log cycle | Time to Swell (hr) | 14.61 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | SJ |

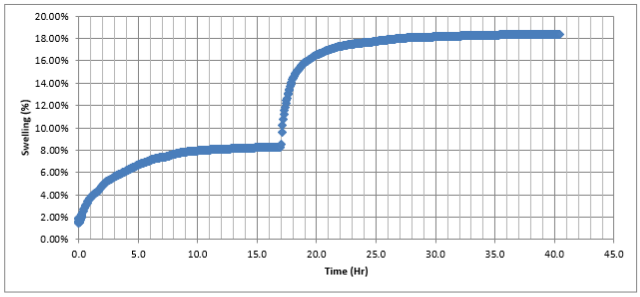
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | BS | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.92 | g |
| Dry Unit Weight | 15.74 | $kN/m^3$ |
| Height of Sample | 10.734 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 15.89 | g's |
| Sample Height | - | 9.056 | mm |
| Testing Height | 10.709 | 11.569 | mm |
| Void Ratio, e | 0.683 | 0.818 | - |
| Moisture content, ω | 20.4% | 38.3% | - |
| Degree of Saturation | 80.5% | 100.0% | - |
| Change in ω | - | 18.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.12 | cm |
| Primary Swell | - | 8.0% | % |
| Ultimate Swell | - | 18.4% | % |
| Volume | 21.71 | 23.45 | $cm^3$ |
| Change in Volume | - | 1.74 | $cm^3$ |
| Mass of Water Lost | - | 4.20 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.41% | %/log cycle | Primary Swell | 8.03% | Stress (psf) 331.6 |
| Slope of Secondary Swelling | 1.22% | %/log cycle | Time to Swell (hr) | 10.45 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | SJ |

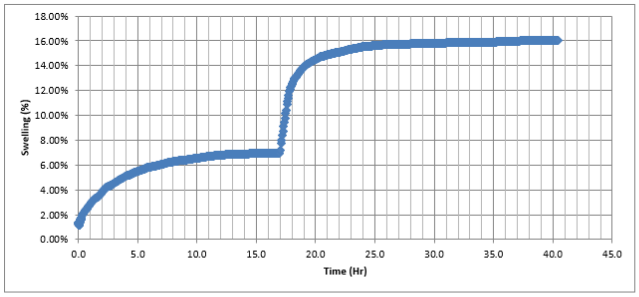
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | BS | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.96 | g |
| Dry Unit Weight | 15.78 | $kN/m^3$ |
| Height of Sample | 10.658 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.05 | g's |
| Sample Height | - | 6.728 | mm |
| Testing Height | 10.668 | 11.399 | mm |
| Void Ratio, e | 0.678 | 0.793 | - |
| Moisture content, ω | 20.6% | 36.8% | - |
| Degree of Saturation | 82.1% | 100.0% | - |
| Change in ω | - | 16.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.44 | cm |
| Primary Swell | - | 6.8% | % |
| Ultimate Swell | - | 16.1% | % |
| Volume | 21.62 | 23.10 | $cm^3$ |
| Change in Volume | - | 1.48 | $cm^3$ |
| Mass of Water Lost | - | 3.53 | g |

NOTES Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.46% | %/log cycle | Primary Swell | 6.85% | Stress (psf) 335.2 |
| Slope of Secondary Swelling | 0.98% | %/log cycle | Time to Swell (hr) | 12.33 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | SJ |

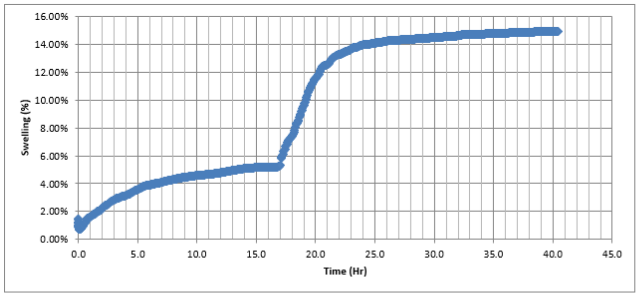
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.82 | g |
| Dry Unit Weight | 15.83 | $kN/m^3$ |
| Height of Sample | 10.856 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 15.57 | g's |
| Sample Height | - | 12.580 | mm |
| Testing Height | 10.866 | 11.423 | mm |
| Void Ratio, e | 0.674 | 0.759 | - |
| Moisture content, ω | 20.5% | 36.2% | - |
| Degree of Saturation | 82.2% | 100.0% | - |
| Change in ω | - | 15.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 2.72 | cm |
| Primary Swell | - | 5.1% | % |
| Ultimate Swell | - | 14.9% | % |
| Volume | 22.02 | 23.15 | $cm^3$ |
| Change in Volume | - | 1.13 | $cm^3$ |
| Mass of Water Lost | - | 2.62 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.38% | %/log cycle | Primary Swell | 5.13% | Stress (psf) | 534.1 |
| Slope of Secondary Swelling | 1.36% | %/log cycle | Time to Swell (hr) | 14.59 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | SJ |

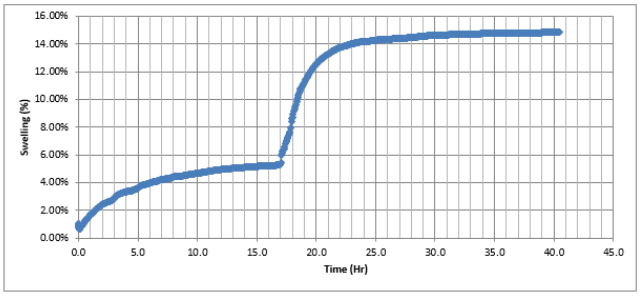
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.76 | g |
| Dry Unit Weight | 15.58 | $kN/m^3$ |
| Height of Sample | 10.897 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.06 | g's |
| Sample Height | - | 11.672 | mm |
| Testing Height | 10.903 | 11.452 | mm |
| Void Ratio, e | 0.700 | 0.786 | - |
| Moisture content, ω | 21.8% | 35.7% | - |
| Degree of Saturation | 84.2% | 100.0% | - |
| Change in ω | - | 13.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.52 | cm |
| Primary Swell | - | 5.0% | % |
| Ultimate Swell | - | 14.8% | % |
| Volume | 22.10 | 23.21 | $cm^3$ |
| Change in Volume | - | 1.11 | $cm^3$ |
| Mass of Water Lost | - | 12.09 | g |

NOTES Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.56% | %/log cycle | Primary Swell | 5.04% | Stress (psf) | 554.4 |
| Slope of Secondary Swelling | 1.83% | %/log cycle | Time to Swell (hr) | 12.72 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SJ |

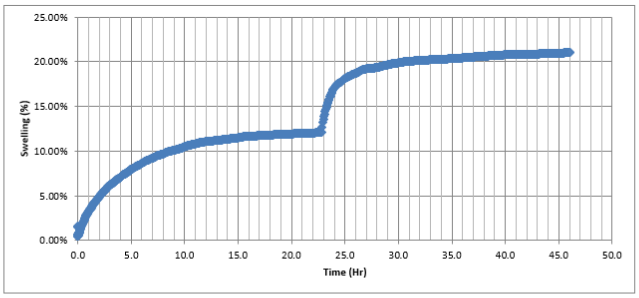
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 48.41 | g |
| Dry Unit Weight | 16.34 | $kN/m^3$ |
| Height of Sample | 12.380 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.43 | g's |
| Sample Height | - | 7.071 | mm |
| Testing Height | 12.332 | 13.765 | mm |
| Void Ratio, e | 0.621 | 0.809 | - |
| Moisture content, ω | 16.3% | 36.5% | - |
| Degree of Saturation | 70.7% | 100.0% | - |
| Change in ω | - | 20.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.11 | 3.00 | cm |
| Primary Swell | - | 11.6% | % |
| Ultimate Swell | - | 21.0% | % |
| Volume | 24.99 | 27.90 | $cm^3$ |
| Change in Volume | - | 2.90 | $cm^3$ |
| Mass of Water Lost | - | 10.76 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 7.32% | %/log cycle | Primary Swell | 11.62% | Stress (psf) | 350.0 |
| Slope of Secondary Swelling | 2.20% | %/log cycle | Time to Swell (hr) | 14.53 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SJ |

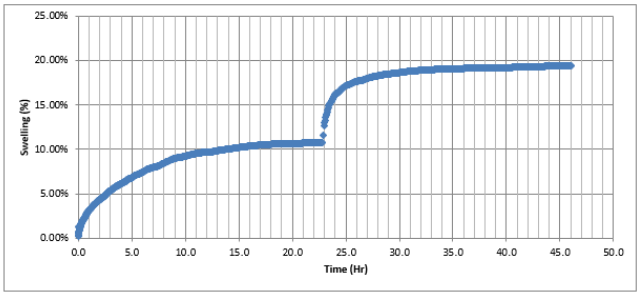
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.34 | g |
| Dry Unit Weight | 16.80 | $kN/m^3$ |
| Height of Sample | 11.156 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.17 | g's |
| Sample Height | - | 5.680 | mm |
| Testing Height | 11.125 | 12.300 | mm |
| Void Ratio, e | 0.576 | 0.743 | - |
| Moisture content, ω | 17.4% | 34.6% | - |
| Degree of Saturation | 81.5% | 100.0% | - |
| Change in ω | - | 17.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.11 | 2.90 | cm |
| Primary Swell | - | 10.6% | % |
| Ultimate Swell | - | 19.5% | % |
| Volume | 22.55 | 24.93 | $cm^3$ |
| Change in Volume | - | 2.38 | $cm^3$ |
| Mass of Water Lost | - | 9.94 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 6.28% | %/log cycle | Primary Swell | 10.56% | Stress (psf) | 339.8 |
| Slope of Secondary Swelling | 1.08% | %/log cycle | Time to Swell (hr) | 16.09 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SJ |

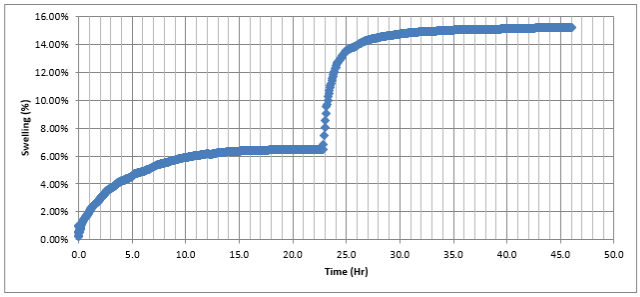
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.79 | g |
| Dry Unit Weight | 15.86 | kN/m$^3$ |
| Height of Sample | 11.308 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.12 | g's |
| Sample Height | - | 8.740 | mm |
| Testing Height | 11.268 | 11.996 | mm |
| Void Ratio, e | 0.670 | 0.778 | - |
| Moisture content, ω | 21.3% | 35.4% | - |
| Degree of Saturation | 85.8% | 100.0% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 2.96 | cm |
| Primary Swell | - | 6.5% | % |
| Ultimate Swell | - | 15.2% | % |
| Volume | 22.84 | 24.31 | cm$^3$ |
| Change in Volume | - | 1.48 | cm$^3$ |
| Mass of Water Lost | - | 9.67 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.88% | %/log cycle | Primary Swell | 6.47% | Stress (psf) | 510.9 |
| Slope of Secondary Swelling | -0.14% | %/log cycle | Time to Swell (hr) | 14.06 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SJ |

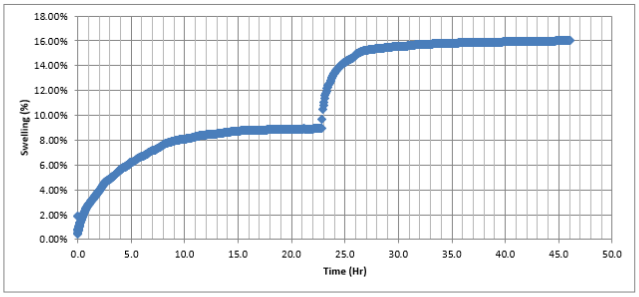
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.48 | g |
| Dry Unit Weight | 16.35 | kN/m$^3$ |
| Height of Sample | 11.323 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.54 | g's |
| Sample Height | - | 6.001 | mm |
| Testing Height | 11.237 | 12.223 | mm |
| Void Ratio, e | 0.620 | 0.762 | - |
| Moisture content, ω | 19.8% | 33.7% | - |
| Degree of Saturation | 86.3% | 100.0% | - |
| Change in ω | - | 13.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.15 | cm |
| Primary Swell | - | 8.8% | % |
| Ultimate Swell | - | 16.0% | % |
| Volume | 22.77 | 24.77 | cm$^3$ |
| Change in Volume | - | 2.00 | cm$^3$ |
| Mass of Water Lost | - | 9.02 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 5.52% | %/log cycle | Primary Swell | 8.78% | Stress (psf) | 520.4 |
| Slope of Secondary Swelling | 0.57% | %/log cycle | Time to Swell (hr) | 12.80 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SJ |

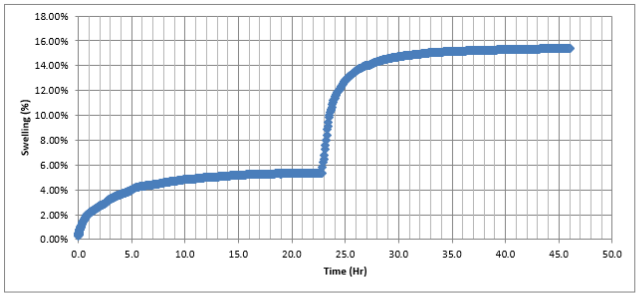
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | BS | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.67 | g |
| Dry Unit Weight | 15.76 | $kN/m^3$ |
| Height of Sample | 10.942 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.54 | g's |
| Sample Height | - | 12.110 | mm |
| Testing Height | 10.902 | 11.478 | mm |
| Void Ratio, e | 0.681 | 0.769 | - |
| Moisture content, ω | 20.2% | 34.6% | - |
| Degree of Saturation | 80.1% | 99.4% | - |
| Change in ω | - | 14.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.63 | cm |
| Primary Swell | - | 5.3% | % |
| Ultimate Swell | - | 15.4% | % |
| Volume | 22.10 | 23.26 | $cm^3$ |
| Change in Volume | - | 1.17 | $cm^3$ |
| Mass of Water Lost | - | 19.25 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.79% | %/log cycle | Primary Swell | 5.28% | Stress (psf) | 846.4 |
| Slope of Secondary Swelling | 0.22% | %/log cycle | Time to Swell (hr) | 14.44 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/21/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SJ |

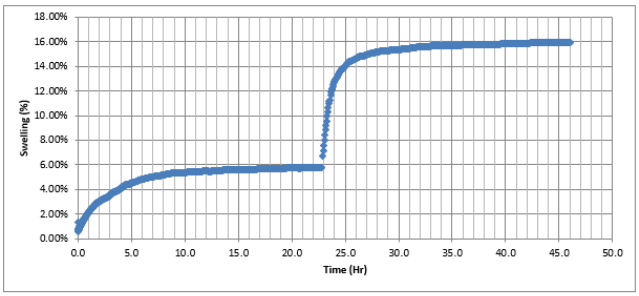
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | BS | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.18 | g |
| Dry Unit Weight | 15.81 | $kN/m^3$ |
| Height of Sample | 11.069 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 39.54 | g's |
| Sample Height | - | 12.209 | mm |
| Testing Height | 11.017 | 11.656 | mm |
| Void Ratio, e | 0.675 | 0.772 | - |
| Moisture content, ω | 20.0% | 35.0% | - |
| Degree of Saturation | 79.9% | 100.0% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 2.86 | cm |
| Primary Swell | - | 5.8% | % |
| Ultimate Swell | - | 16.0% | % |
| Volume | 22.33 | 23.63 | $cm^3$ |
| Change in Volume | - | 1.30 | $cm^3$ |
| Mass of Water Lost | - | 11.38 | g |

NOTES Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.35% | %/log cycle | Primary Swell | 5.80% | Stress (psf) | 846.9 |
| Slope of Secondary Swelling | -0.51% | %/log cycle | Time to Swell (hr) | 12.43 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | SJ |

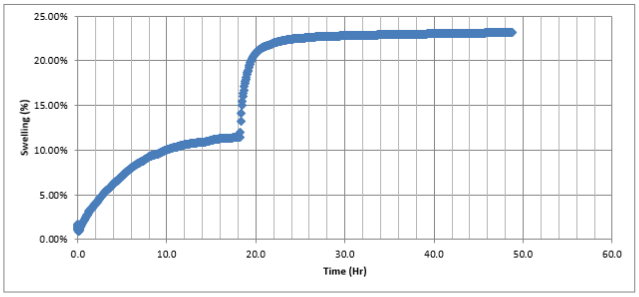
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.34 | g |
| Dry Unit Weight | 16.48 | kN/m$^3$ |
| Height of Sample | 11.120 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.38 | g's |
| Sample Height | - | 6.387 | mm |
| Testing Height | 11.149 | 12.161 | mm |
| Void Ratio, e | 0.607 | 0.753 | - |
| Moisture content, ω | 19.4% | 38.5% | - |
| Degree of Saturation | 86.4% | 100.0% | - |
| Change in ω | - | 19.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.01 | cm |
| Primary Swell | - | 9.1% | % |
| Ultimate Swell | - | 23.2% | % |
| Volume | 22.60 | 24.65 | cm$^3$ |
| Change in Volume | - | 2.05 | cm$^3$ |
| Mass of Water Lost | - | 5.74 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.11% | %/log cycle | Primary Swell | 9.08% | Stress (psf) | 451.7 |
| Slope of Secondary Swelling | 6.02% | %/log cycle | Time to Swell (hr) | 6.81 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | SJ |

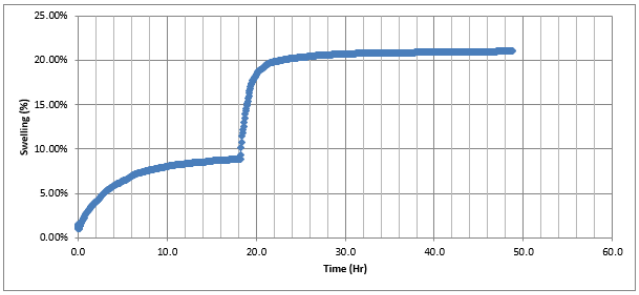
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.79 | g |
| Dry Unit Weight | 15.54 | kN/m$^3$ |
| Height of Sample | 10.820 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.09 | g's |
| Sample Height | - | 5.723 | mm |
| Testing Height | 10.796 | 11.355 | mm |
| Void Ratio, e | 0.705 | 0.793 | - |
| Moisture content, ω | 23.5% | 39.9% | - |
| Degree of Saturation | 89.9% | 100.0% | - |
| Change in ω | - | 16.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 2.95 | cm |
| Primary Swell | - | 5.2% | % |
| Ultimate Swell | - | 21.0% | % |
| Volume | 21.88 | 23.01 | cm$^3$ |
| Change in Volume | - | 1.13 | cm$^3$ |
| Mass of Water Lost | - | 5.57 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.22% | %/log cycle | Primary Swell | 5.17% | Stress (psf) | 440.6 |
| Slope of Secondary Swelling | 3.34% | %/log cycle | Time to Swell (hr) | 1.35 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | SJ |

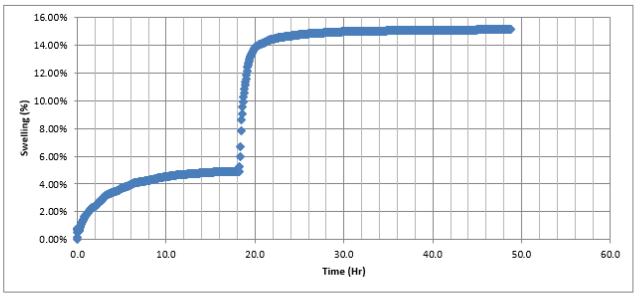
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.92 | g |
| Dry Unit Weight | 15.30 | kN/m$^3$ |
| Height of Sample | 10.795 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.47 | g's |
| Sample Height | - | 9.139 | mm |
| Testing Height | 10.885 | 11.418 | mm |
| Void Ratio, e | 0.732 | 0.816 | - |
| Moisture content, ω | 24.8% | 38.9% | - |
| Degree of Saturation | 91.4% | 100.0% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.10 | cm |
| Primary Swell | - | 4.9% | % |
| Ultimate Swell | - | 15.1% | % |
| Volume | 22.06 | 23.14 | cm$^3$ |
| Change in Volume | - | 1.08 | cm$^3$ |
| Mass of Water Lost | - | 4.64 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.80% | %/log cycle | Primary Swell | 4.89% | Stress (psf) | 666.3 |
| Slope of Secondary Swelling | 1.50% | %/log cycle | Time to Swell (hr) | 16.35 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | SJ |

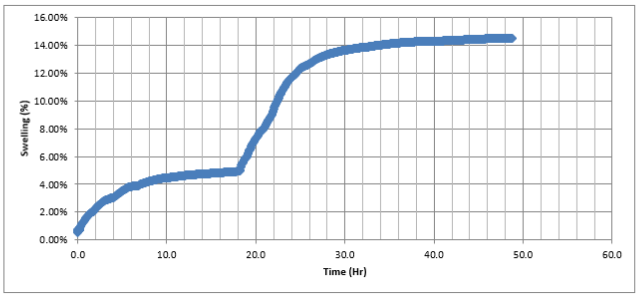
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.74 | g |
| Dry Unit Weight | 15.31 | kN/m$^3$ |
| Height of Sample | 10.886 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.75 | g's |
| Sample Height | - | 6.793 | mm |
| Testing Height | 10.868 | 11.576 | mm |
| Void Ratio, e | 0.730 | 0.843 | - |
| Moisture content, ω | 24.3% | 38.4% | - |
| Degree of Saturation | 90.0% | 100.0% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.38 | cm |
| Primary Swell | - | 6.5% | % |
| Ultimate Swell | - | 14.5% | % |
| Volume | 22.03 | 23.46 | cm$^3$ |
| Change in Volume | - | 1.44 | cm$^3$ |
| Mass of Water Lost | - | 5.58 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.77% | %/log cycle | Primary Swell | 6.52% | Stress (psf) | 662.7 |
| Slope of Secondary Swelling | 1.76% | %/log cycle | Time to Swell (hr) | 144.30 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | SJ |

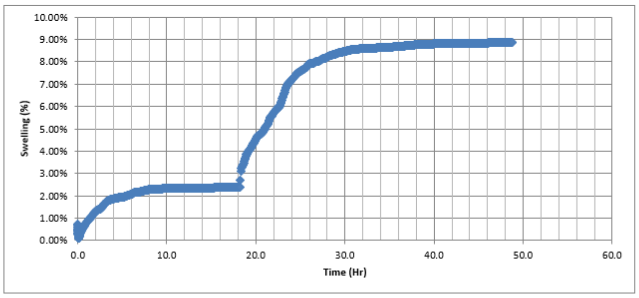
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.05 | g |
| Dry Unit Weight | 14.91 | kN/m$^3$ |
| Height of Sample | 10.841 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.76 | g's |
| Sample Height | - | 12.654 | mm |
| Testing Height | 10.909 | 11.162 | mm |
| Void Ratio, e | 0.776 | 0.817 | - |
| Moisture content, ω | 25.1% | 36.0% | - |
| Degree of Saturation | 87.4% | 100.0% | - |
| Change in ω | - | 10.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 3.48 | cm |
| Primary Swell | - | 2.3% | % |
| Ultimate Swell | - | 8.9% | % |
| Volume | 22.11 | 22.62 | cm$^3$ |
| Change in Volume | - | 0.51 | cm$^3$ |
| Mass of Water Lost | - | 3.16 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.02% | %/log cycle | Primary Swell | 2.32% | Stress (psf) | 1111.6 |
| Slope of Secondary Swelling | 0.20% | %/log cycle | Time to Swell (hr) | 9.25 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/19/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | SJ |

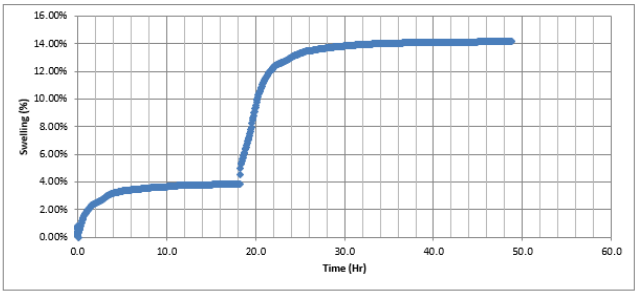
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.20 | g |
| Dry Unit Weight | 15.49 | kN/m$^3$ |
| Height of Sample | 10.932 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 31.49 | g's |
| Sample Height | - | 12.011 | mm |
| Testing Height | 11.004 | 11.413 | mm |
| Void Ratio, e | 0.710 | 0.773 | - |
| Moisture content, ω | 22.7% | 35.6% | - |
| Degree of Saturation | 86.2% | 100.0% | - |
| Change in ω | - | 13.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.23 | cm |
| Primary Swell | - | 3.7% | % |
| Ultimate Swell | - | 14.2% | % |
| Volume | 22.30 | 23.13 | cm$^3$ |
| Change in Volume | - | 0.83 | cm$^3$ |
| Mass of Water Lost | - | 4.98 | g |

NOTES Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.78% | %/log cycle | Primary Swell | 3.71% | Stress (psf) | 1103.4 |
| Slope of Secondary Swelling | 0.60% | %/log cycle | Time to Swell (hr) | 10.18 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | SJ |

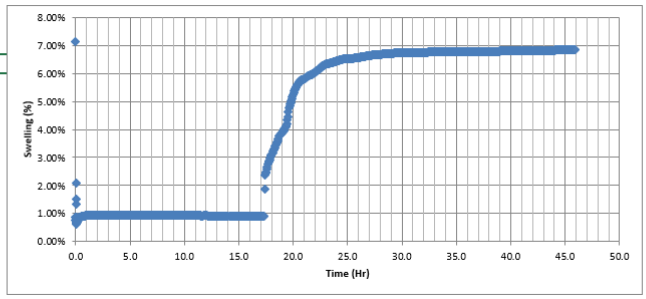
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 8-10FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 47.50 | g |
| Dry Unit Weight | 17.67 | kN/m$^3$ |
| Height of Sample | 11.369 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 36.47 | g's |
| Sample Height | - | 3.950 | mm |
| Testing Height | 11.348 | 11.456 | mm |
| Void Ratio, e | 0.499 | 0.513 | - |
| Moisture content, ω | 14.6% | 22.5% | - |
| Degree of Saturation | 79.2% | 100.0% | - |
| Change in ω | - | 7.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.47 | cm |
| Primary Swell | - | 0.9% | % |
| Ultimate Swell | - | 6.8% | % |
| Volume | 23.00 | 23.22 | cm$^3$ |
| Change in Volume | - | 0.22 | cm$^3$ |
| Mass of Water Lost | - | 5.98 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.13% | %/log cycle | Primary Swell | 0.95% | Stress (psf) | 587.1 |
| Slope of Secondary Swelling | -0.11% | %/log cycle | Time to Swell (hr) | 8.06 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | SJ |

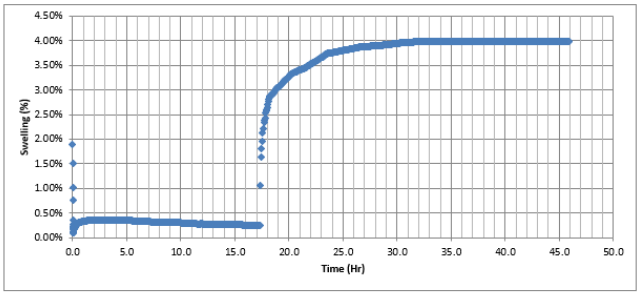
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 8-10FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.14 | g |
| Dry Unit Weight | 16.98 | kN/m$^3$ |
| Height of Sample | 11.161 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 36.18 | g's |
| Sample Height | - | 3.169 | mm |
| Testing Height | 11.137 | 11.173 | mm |
| Void Ratio, e | 0.560 | 0.565 | - |
| Moisture content, ω | 15.5% | 24.3% | - |
| Degree of Saturation | 74.9% | 100.0% | - |
| Change in ω | - | 8.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.27 | cm |
| Primary Swell | - | 0.3% | % |
| Ultimate Swell | - | 4.0% | % |
| Volume | 22.57 | 22.65 | cm$^3$ |
| Change in Volume | - | 0.07 | cm$^3$ |
| Mass of Water Lost | - | 5.37 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.08% | %/log cycle | Primary Swell | 0.33% | Stress (psf) | 580.7 |
| Slope of Secondary Swelling | -0.23% | %/log cycle | Time to Swell (hr) | 7.99 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | SJ |

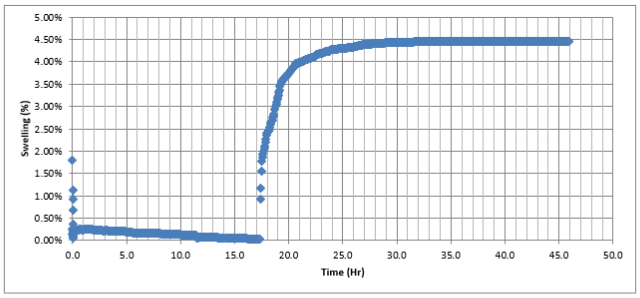
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 8-10FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 47.30 | g |
| Dry Unit Weight | 17.40 | kN/m$^3$ |
| Height of Sample | 11.476 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 36.85 | g's |
| Sample Height | - | 5.279 | mm |
| Testing Height | 11.455 | 11.473 | mm |
| Void Ratio, e | 0.522 | 0.524 | - |
| Moisture content, ω | 14.8% | 22.0% | - |
| Degree of Saturation | 76.7% | 100.0% | - |
| Change in ω | - | 7.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.42 | cm |
| Primary Swell | - | 0.2% | % |
| Ultimate Swell | - | 4.4% | % |
| Volume | 23.22 | 23.25 | cm$^3$ |
| Change in Volume | - | 0.04 | cm$^3$ |
| Mass of Water Lost | - | 4.56 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.02% | %/log cycle | Primary Swell | 0.16% | Stress (psf) | 898.1 |
| Slope of Secondary Swelling | -0.44% | %/log cycle | Time to Swell (hr) | 8.84 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | SJ |

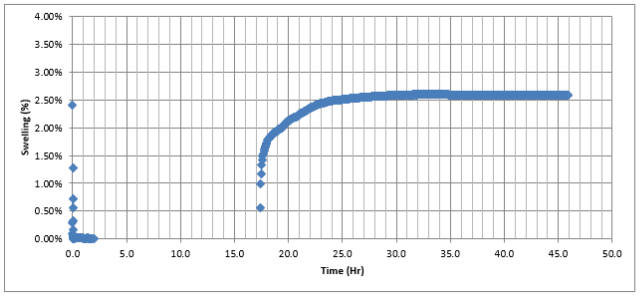
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 8-10FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.80 | g |
| Dry Unit Weight | 17.59 | kN/m$^3$ |
| Height of Sample | 11.298 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 36.88 | g's |
| Sample Height | - | 4.759 | mm |
| Testing Height | 11.261 | 11.249 | mm |
| Void Ratio, e | 0.506 | 0.504 | - |
| Moisture content, ω | 14.3% | 20.8% | - |
| Degree of Saturation | 76.6% | 100.0% | - |
| Change in ω | - | 6.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.31 | cm |
| Primary Swell | - | -0.1% | % |
| Ultimate Swell | - | 2.6% | % |
| Volume | 22.82 | 22.80 | cm$^3$ |
| Change in Volume | - | -0.02 | cm$^3$ |
| Mass of Water Lost | - | 8.46 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.06% | %/log cycle | Primary Swell | -0.10% | Stress (psf) | 900.9 |
| Slope of Secondary Swelling | -0.34% | %/log cycle | Time to Swell (hr) | 8.57 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | SJ |

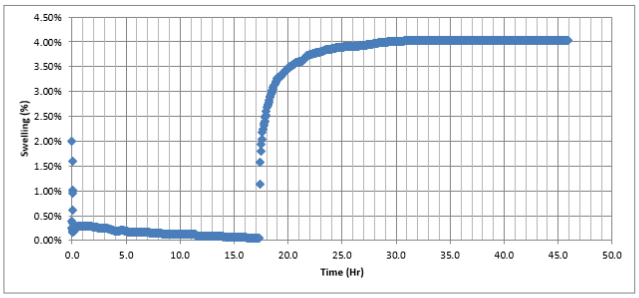
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B5 | |
| Depth | 8-10FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.37 | g |
| Dry Unit Weight | 17.14 | kN/m$^3$ |
| Height of Sample | 11.079 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 36.76 | g's |
| Sample Height | - | 8.715 | mm |
| Testing Height | 11.060 | 11.077 | mm |
| Void Ratio, e | 0.546 | 0.548 | - |
| Moisture content, ω | 15.9% | 22.8% | - |
| Degree of Saturation | 78.5% | 100.0% | - |
| Change in ω | - | 6.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.99 | cm |
| Primary Swell | - | 0.2% | % |
| Ultimate Swell | - | 4.0% | % |
| Volume | 22.42 | 22.45 | cm$^3$ |
| Change in Volume | - | 0.04 | cm$^3$ |
| Mass of Water Lost | - | 12.69 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.02% | %/log cycle | Primary Swell | 0.16% | Stress (psf) | 1436.6 |
| Slope of Secondary Swelling | -0.36% | %/log cycle | Time to Swell (hr) | 8.50 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

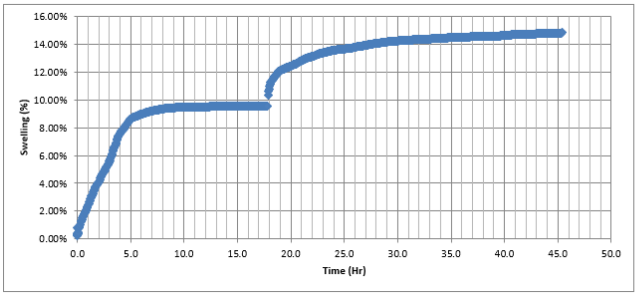
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.37 | g |
| Dry Unit Weight | 14.96 | kN/m$^3$ |
| Height of Sample | 11.635 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.13 | g's |
| Sample Height | - | 6.380 | mm |
| Testing Height | 11.608 | 12.704 | mm |
| Void Ratio, e | 0.771 | 0.938 | - |
| Moisture content, ω | 23.7% | 39.7% | - |
| Degree of Saturation | 82.9% | 100.0% | - |
| Change in ω | - | 16.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.27 | cm |
| Primary Swell | - | 9.4% | % |
| Ultimate Swell | - | 14.8% | % |
| Volume | 23.53 | 25.75 | cm$^3$ |
| Change in Volume | - | 2.22 | cm$^3$ |
| Mass of Water Lost | - | 2.46 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 7.59% | %/log cycle | Primary Swell | 9.43% | Stress (psf) | 183.5 |
| Slope of Secondary Swelling | 0.27% | %/log cycle | Time to Swell (hr) | 7.91 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

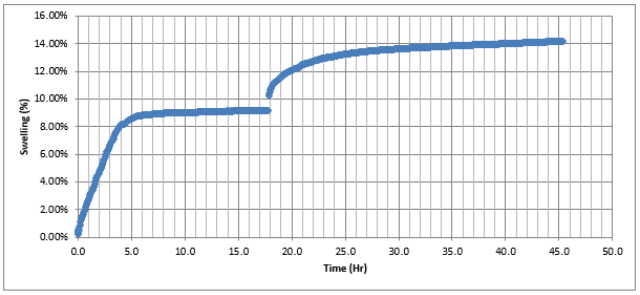
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.86 | g |
| Dry Unit Weight | 15.10 | kN/m$^3$ |
| Height of Sample | 11.699 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.25 | g's |
| Sample Height | - | 6.172 | mm |
| Testing Height | 11.679 | 12.726 | mm |
| Void Ratio, e | 0.754 | 0.912 | - |
| Moisture content, ω | 23.1% | 38.2% | - |
| Degree of Saturation | 82.8% | 100.0% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.43 | cm |
| Primary Swell | - | 9.0% | % |
| Ultimate Swell | - | 14.2% | % |
| Volume | 23.67 | 25.79 | cm$^3$ |
| Change in Volume | - | 2.12 | cm$^3$ |
| Mass of Water Lost | - | 4.37 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 6.81% | %/log cycle | Primary Swell | 8.96% | Stress (psf) | 189.1 |
| Slope of Secondary Swelling | 0.54% | %/log cycle | Time to Swell (hr) | 7.58 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

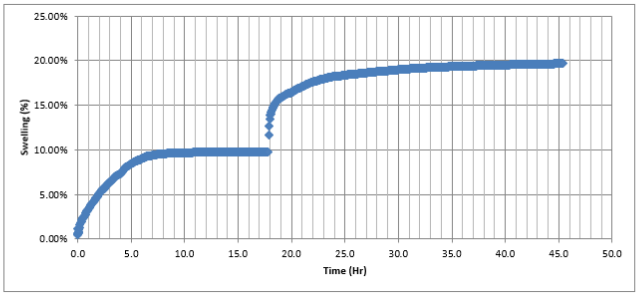
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.40 | g |
| Dry Unit Weight | 20.95 | kN/m$^3$ |
| Height of Sample | 8.037 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.20 | g's |
| Sample Height | - | 8.697 | mm |
| Testing Height | 8.007 | 8.782 | mm |
| Void Ratio, e | 0.264 | 0.387 | - |
| Moisture content, ω | 25.2% | 41.1% | - |
| Degree of Saturation | 100.0% | 100.0% | - |
| Change in ω | - | 15.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.25 | 3.28 | cm |
| Primary Swell | - | 9.7% | % |
| Ultimate Swell | - | 19.7% | % |
| Volume | 16.23 | 17.80 | cm$^3$ |
| Change in Volume | - | 1.57 | cm$^3$ |
| Mass of Water Lost | - | 2.81 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 6.78% | %/log cycle | Primary Swell | 9.67% | Stress (psf) | 292.3 |
| Slope of Secondary Swelling | 0.24% | %/log cycle | Time to Swell (hr) | 7.97 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

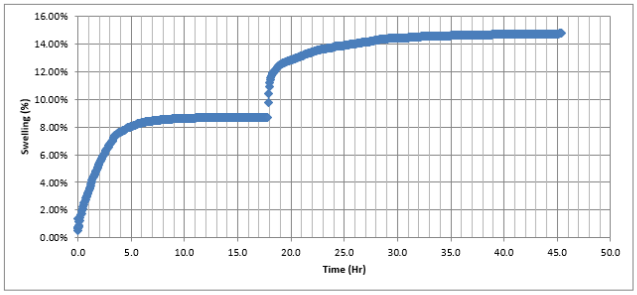
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.20 | g |
| Dry Unit Weight | 14.81 | $kN/m^3$ |
| Height of Sample | 11.669 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.25 | g's |
| Sample Height | - | 5.961 | mm |
| Testing Height | 11.632 | 12.632 | mm |
| Void Ratio, e | 0.789 | 0.943 | - |
| Moisture content, ω | 24.2% | 41.2% | - |
| Degree of Saturation | 82.9% | 100.0% | - |
| Change in ω | - | 17.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.45 | cm |
| Primary Swell | - | 8.6% | % |
| Ultimate Swell | - | 14.7% | % |
| Volume | 23.58 | 25.60 | $cm^3$ |
| Change in Volume | - | 2.03 | $cm^3$ |
| Mass of Water Lost | - | 2.72 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 5.79% | %/log cycle | Primary Swell | 8.60% | Stress (psf) | 279.5 |
| Slope of Secondary Swelling | 0.24% | %/log cycle | Time to Swell (hr) | 7.88 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

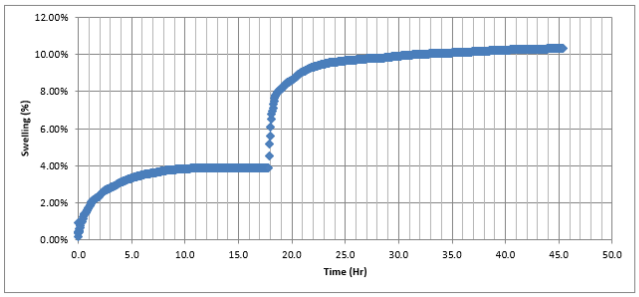
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.33 | g |
| Dry Unit Weight | 14.11 | $kN/m^3$ |
| Height of Sample | 11.232 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.03 | g's |
| Sample Height | - | 12.320 | mm |
| Testing Height | 11.204 | 11.635 | mm |
| Void Ratio, e | 0.877 | 0.949 | - |
| Moisture content, ω | 26.5% | 41.5% | - |
| Degree of Saturation | 81.6% | 100.0% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.23 | 2.87 | cm |
| Primary Swell | - | 3.8% | % |
| Ultimate Swell | - | 10.3% | % |
| Volume | 22.71 | 23.58 | $cm^3$ |
| Change in Volume | - | 0.87 | $cm^3$ |
| Mass of Water Lost | - | 6.87 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.15% | %/log cycle | Primary Swell | 3.84% | Stress (psf) | 453.9 |
| Slope of Secondary Swelling | 0.19% | %/log cycle | Time to Swell (hr) | 8.97 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

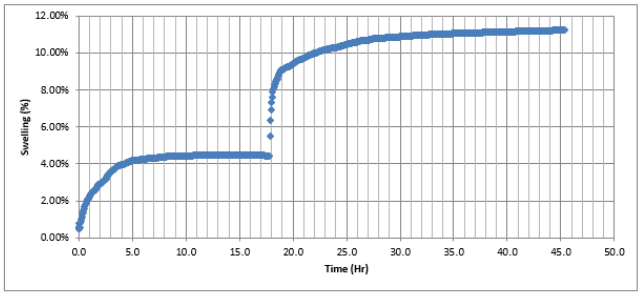
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.64 | g |
| Dry Unit Weight | 14.08 | $kN/m^3$ |
| Height of Sample | 11.445 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.25 | g's |
| Sample Height | - | 12.439 | mm |
| Testing Height | 11.424 | 11.929 | mm |
| Void Ratio, e | 0.881 | 0.965 | - |
| Moisture content, ω | 25.3% | 40.6% | - |
| Degree of Saturation | 77.5% | 100.0% | - |
| Change in ω | - | 15.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.48 | cm |
| Primary Swell | - | 4.4% | % |
| Ultimate Swell | - | 11.2% | % |
| Volume | 23.15 | 24.18 | $cm^3$ |
| Change in Volume | - | 1.02 | $cm^3$ |
| Mass of Water Lost | - | 3.46 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.38% | %/log cycle | Primary Swell | 4.42% | Stress (psf) | 462.5 |
| Slope of Secondary Swelling | 0.13% | %/log cycle | Time to Swell (hr) | 8.08 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | SHIVANGI |

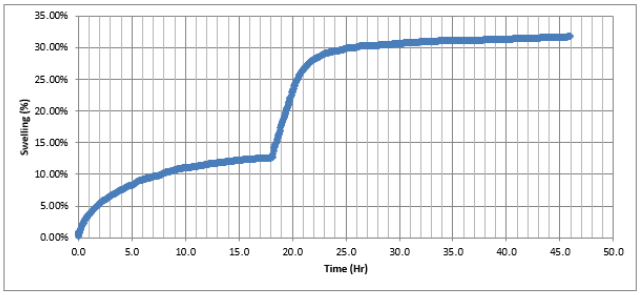
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.89 | g |
| Dry Unit Weight | 15.26 | $kN/m^3$ |
| Height of Sample | 10.988 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 22.30 | g's |
| Sample Height | - | 3.594 | mm |
| Testing Height | 10.947 | 12.068 | mm |
| Void Ratio, e | 0.736 | 0.914 | - |
| Moisture content, ω | 24.3% | 49.6% | - |
| Degree of Saturation | 89.1% | 100.0% | - |
| Change in ω | - | 25.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 2.99 | cm |
| Primary Swell | - | 10.2% | % |
| Ultimate Swell | - | 31.8% | % |
| Volume | 22.19 | 24.46 | $cm^3$ |
| Change in Volume | - | 2.27 | $cm^3$ |
| Mass of Water Lost | - | 3.54 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 6.61% | %/log cycle | Primary Swell | 10.24% | Stress (psf) | 361.1 |
| Slope of Secondary Swelling | 7.00% | %/log cycle | Time to Swell (hr) | 7.88 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | SHIVANGI |

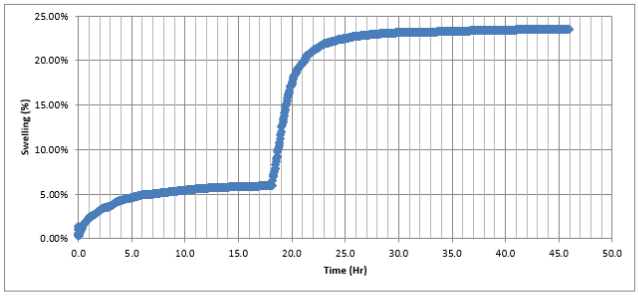
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.09 | g |
| Dry Unit Weight | 14.62 | $kN/m^3$ |
| Height of Sample | 11.278 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 22.81 | g's |
| Sample Height | - | 5.027 | mm |
| Testing Height | 11.228 | 11.816 | mm |
| Void Ratio, e | 0.811 | 0.906 | - |
| Moisture content, ω | 27.0% | 47.6% | - |
| Degree of Saturation | 90.0% | 100.0% | - |
| Change in ω | - | 20.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.23 | cm |
| Primary Swell | - | 5.2% | % |
| Ultimate Swell | - | 23.5% | % |
| Volume | 22.76 | 23.95 | $cm^3$ |
| Change in Volume | - | 1.19 | $cm^3$ |
| Mass of Water Lost | - | 5.46 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.06% | %/log cycle | Primary Swell | 5.24% | Stress (psf) | 550.4 |
| Slope of Secondary Swelling | 2.25% | %/log cycle | Time to Swell (hr) | 8.36 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | SHIVANGI |

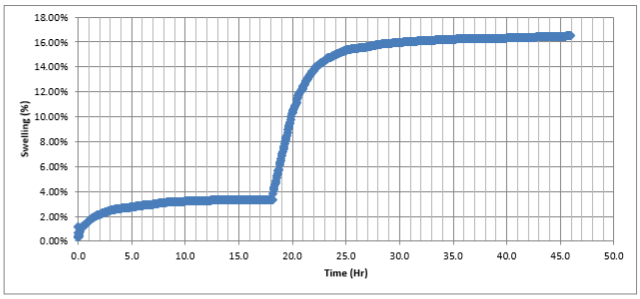
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.01 | g |
| Dry Unit Weight | 13.88 | $kN/m^3$ |
| Height of Sample | 11.367 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 22.63 | g's |
| Sample Height | - | 4.678 | mm |
| Testing Height | 11.323 | 11.680 | mm |
| Void Ratio, e | 0.909 | 0.969 | - |
| Moisture content, ω | 29.4% | 48.5% | - |
| Degree of Saturation | 87.4% | 100.0% | - |
| Change in ω | - | 19.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.03 | cm |
| Primary Swell | - | 3.2% | % |
| Ultimate Swell | - | 16.5% | % |
| Volume | 22.95 | 23.67 | $cm^3$ |
| Change in Volume | - | 0.72 | $cm^3$ |
| Mass of Water Lost | - | 7.28 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.60% | %/log cycle | Primary Swell | 3.15% | Stress (psf) | 541.5 |
| Slope of Secondary Swelling | 0.54% | %/log cycle | Time to Swell (hr) | 8.52 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | SHIVANGI |

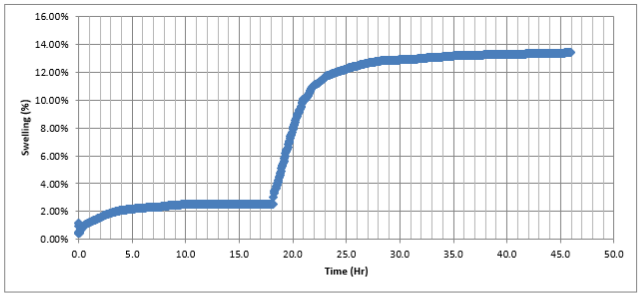
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.84 | g |
| Dry Unit Weight | 13.46 | $kN/m^3$ |
| Height of Sample | 11.191 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 22.83 | g's |
| Sample Height | - | 8.904 | mm |
| Testing Height | 11.112 | 11.385 | mm |
| Void Ratio, e | 0.969 | 1.017 | - |
| Moisture content, ω | 32.2% | 47.1% | - |
| Degree of Saturation | 89.8% | 100.0% | - |
| Change in ω | - | 14.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.11 | 3.02 | cm |
| Primary Swell | - | 2.5% | % |
| Ultimate Swell | - | 13.4% | % |
| Volume | 22.52 | 23.08 | $cm^3$ |
| Change in Volume | - | 0.55 | $cm^3$ |
| Mass of Water Lost | - | 7.34 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.16% | %/log cycle | Primary Swell | 2.46% | Stress (psf) | 899.9 |
| Slope of Secondary Swelling | 0.29% | %/log cycle | Time to Swell (hr) | 9.35 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/16/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | SHIVANGI |

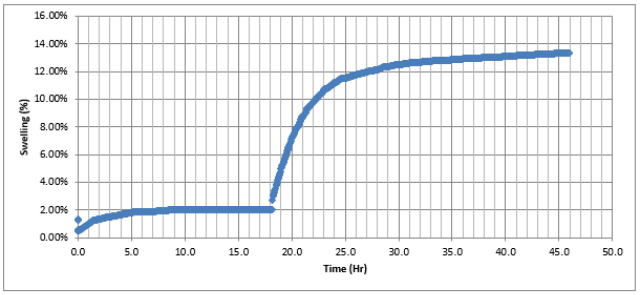
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.04 | g |
| Dry Unit Weight | 13.30 | $kN/m^3$ |
| Height of Sample | 11.059 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 22.63 | g's |
| Sample Height | - | 8.345 | mm |
| Testing Height | 10.982 | 11.201 | mm |
| Void Ratio, e | 0.991 | 1.031 | - |
| Moisture content, ω | 32.7% | 48.0% | - |
| Degree of Saturation | 89.0% | 100.0% | - |
| Change in ω | - | 15.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.11 | 2.94 | cm |
| Primary Swell | - | 2.0% | % |
| Ultimate Swell | - | 13.3% | % |
| Volume | 22.26 | 22.70 | $cm^3$ |
| Change in Volume | - | 0.44 | $cm^3$ |
| Mass of Water Lost | - | 5.28 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.04% | %/log cycle | Primary Swell | 2.00% | Stress (psf) | 889.3 |
| Slope of Secondary Swelling | 0.16% | %/log cycle | Time to Swell (hr) | 8.78 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SHIVANGI |

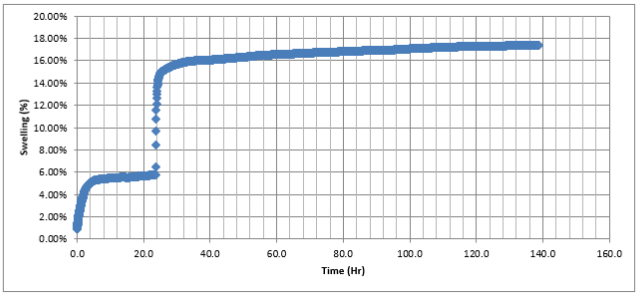
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.52 | g |
| Dry Unit Weight | 15.28 | kN/m$^3$ |
| Height of Sample | 11.562 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 81.77 | g's |
| Sample Height | - | 6.237 | mm |
| Testing Height | 11.532 | 12.150 | mm |
| Void Ratio, e | 0.733 | 0.826 | - |
| Moisture content, ω | 25.0% | 41.4% | - |
| Degree of Saturation | 92.1% | 100.0% | - |
| Change in ω | - | 16.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.78 | cm |
| Primary Swell | - | 5.4% | % |
| Ultimate Swell | - | 17.4% | % |
| Volume | 23.37 | 24.63 | cm$^3$ |
| Change in Volume | - | 1.25 | cm$^3$ |
| Mass of Water Lost | - | 15.04 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.41% | %/log cycle | Primary Swell | 5.35% | Stress (psf) | 521.3 |
| Slope of Secondary Swelling | 0.43% | %/log cycle | Time to Swell (hr) | 5.63 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SHIVANGI |

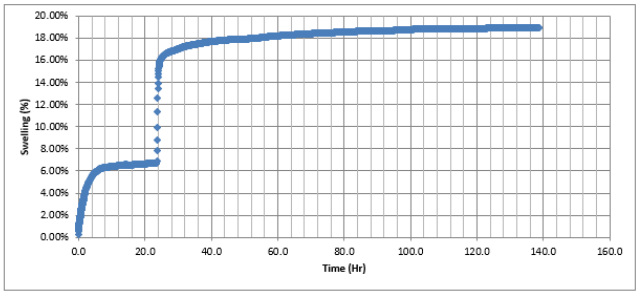
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.06 | g |
| Dry Unit Weight | 15.32 | kN/m$^3$ |
| Height of Sample | 11.577 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 81.01 | g's |
| Sample Height | - | 6.172 | mm |
| Testing Height | 11.557 | 12.284 | mm |
| Void Ratio, e | 0.729 | 0.837 | - |
| Moisture content, ω | 25.9% | 42.9% | - |
| Degree of Saturation | 95.9% | 100.0% | - |
| Change in ω | - | 17.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.09 | 2.58 | cm |
| Primary Swell | - | 6.3% | % |
| Ultimate Swell | - | 19.0% | % |
| Volume | 23.42 | 24.90 | cm$^3$ |
| Change in Volume | - | 1.47 | cm$^3$ |
| Mass of Water Lost | - | 11.17 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.89% | %/log cycle | Primary Swell | 6.29% | Stress (psf) | 513.5 |
| Slope of Secondary Swelling | 0.76% | %/log cycle | Time to Swell (hr) | 6.94 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SHIVANGI |

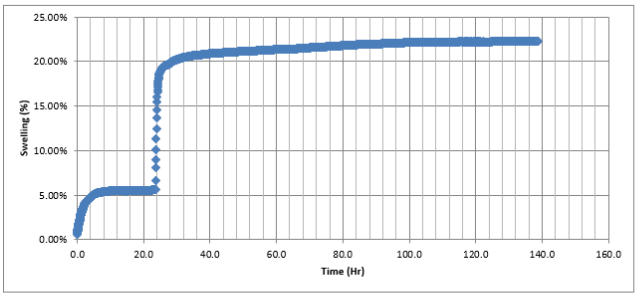
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.98 | g |
| Dry Unit Weight | 21.88 | $kN/m^3$ |
| Height of Sample | 8.100 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 81.87 | g's |
| Sample Height | - | 9.112 | mm |
| Testing Height | 8.071 | 8.506 | mm |
| Void Ratio, e | 0.211 | 0.276 | - |
| Moisture content, ω | 26.0% | 41.0% | - |
| Degree of Saturation | 100.0% | 100.0% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.26 | 3.09 | cm |
| Primary Swell | - | 5.4% | % |
| Ultimate Swell | - | 22.3% | % |
| Volume | 16.36 | 17.24 | $cm^3$ |
| Change in Volume | - | 0.88 | $cm^3$ |
| Mass of Water Lost | - | 11.47 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.40% | %/log cycle | Primary Swell | 5.40% | Stress (psf) | 804.0 |
| Slope of Secondary Swelling | 0.22% | %/log cycle | Time to Swell (hr) | 6.81 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SHIVANGI |

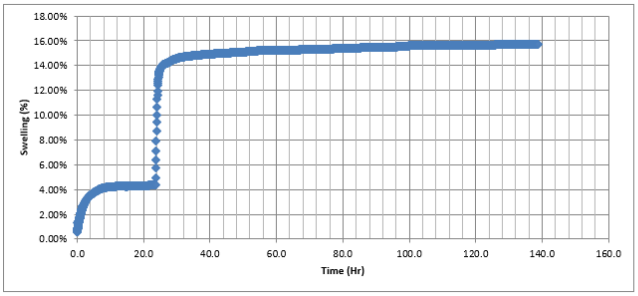
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.23 | g |
| Dry Unit Weight | 15.25 | $kN/m^3$ |
| Height of Sample | 11.684 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 81.75 | g's |
| Sample Height | - | 6.326 | mm |
| Testing Height | 11.648 | 12.134 | mm |
| Void Ratio, e | 0.737 | 0.810 | - |
| Moisture content, ω | 26.0% | 40.5% | - |
| Degree of Saturation | 95.2% | 100.0% | - |
| Change in ω | - | 14.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.04 | cm |
| Primary Swell | - | 4.2% | % |
| Ultimate Swell | - | 15.7% | % |
| Volume | 23.61 | 24.59 | $cm^3$ |
| Change in Volume | - | 0.99 | $cm^3$ |
| Mass of Water Lost | - | 14.04 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.76% | %/log cycle | Primary Swell | 4.17% | Stress (psf) | 773.7 |
| Slope of Secondary Swelling | 0.34% | %/log cycle | Time to Swell (hr) | 8.49 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SHIVANGI |

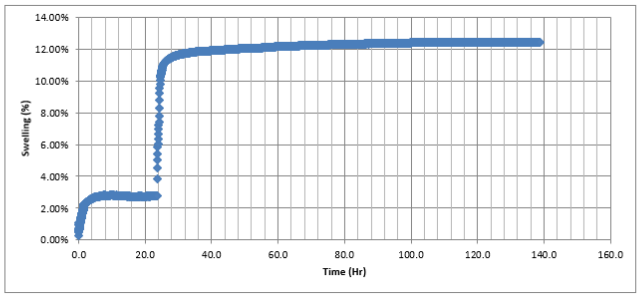
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.93 | g |
| Dry Unit Weight | 15.33 | kN/m$^3$ |
| Height of Sample | 11.552 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 81.73 | g's |
| Sample Height | - | 12.930 | mm |
| Testing Height | 11.524 | 11.851 | mm |
| Void Ratio, e | 0.728 | 0.777 | - |
| Moisture content, ω | 25.9% | 37.8% | - |
| Degree of Saturation | 95.9% | 100.0% | - |
| Change in ω | - | 11.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.08 | cm |
| Primary Swell | - | 2.8% | % |
| Ultimate Swell | - | 12.4% | % |
| Volume | 23.36 | 24.02 | cm$^3$ |
| Change in Volume | - | 0.66 | cm$^3$ |
| Mass of Water Lost | - | 13.47 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.20% | %/log cycle | Primary Swell | 2.84% | Stress (psf) | 1267.9 |
| Slope of Secondary Swelling | -0.24% | %/log cycle | Time to Swell (hr) | 6.67 | | |

**Specimen:**

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SHIVANGI |

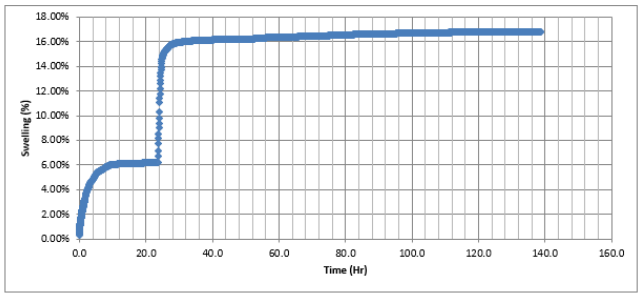
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B6 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 47.71 | g |
| Dry Unit Weight | 15.74 | kN/m$^3$ |
| Height of Sample | 11.816 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 81.40 | g's |
| Sample Height | - | 13.048 | mm |
| Testing Height | 11.795 | 12.484 | mm |
| Void Ratio, e | 0.683 | 0.781 | - |
| Moisture content, ω | 24.4% | 39.1% | - |
| Degree of Saturation | 96.5% | 100.0% | - |
| Change in ω | - | 14.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.00 | cm |
| Primary Swell | - | 5.8% | % |
| Ultimate Swell | - | 16.8% | % |
| Volume | 23.91 | 25.30 | cm$^3$ |
| Change in Volume | - | 1.40 | cm$^3$ |
| Mass of Water Lost | - | 12.64 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.59% | %/log cycle | Primary Swell | 5.84% | Stress (psf) | 1261.4 |
| Slope of Secondary Swelling | 0.97% | %/log cycle | Time to Swell (hr) | 8.15 | | |

**Specimen:**

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | SJ |

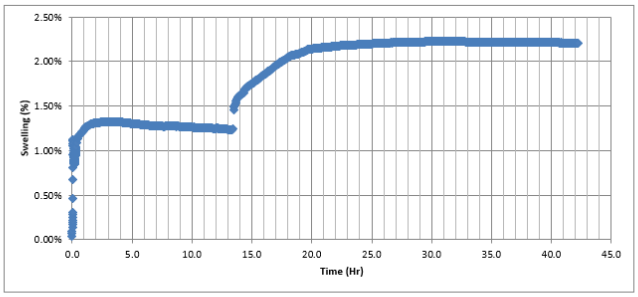
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.85 | g |
| Dry Unit Weight | 16.30 | kN/m$^3$ |
| Height of Sample | 10.262 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 10.33 | g's |
| Sample Height | - | 5.377 | mm |
| Testing Height | 10.230 | 10.367 | mm |
| Void Ratio, e | 0.625 | 0.646 | - |
| Moisture content, ω | 12.7% | 27.8% | - |
| Degree of Saturation | 55.1% | 100.0% | - |
| Change in ω | - | 15.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.39 | cm |
| Primary Swell | - | 1.3% | % |
| Ultimate Swell | - | 2.2% | % |
| Volume | 20.73 | 21.01 | cm$^3$ |
| Change in Volume | - | 0.28 | cm$^3$ |
| Mass of Water Lost | - | 1.50 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.40% | %/log cycle | Primary Swell | 1.34% | Stress (psf) | 190.4 |
| Slope of Secondary Swelling | -0.16% | %/log cycle | Time to Swell (hr) | 3.11 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | SJ |

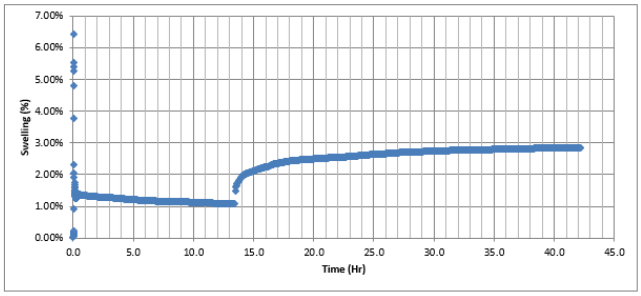
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.16 | g |
| Dry Unit Weight | 14.84 | kN/m$^3$ |
| Height of Sample | 11.176 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 10.43 | g's |
| Sample Height | - | 6.148 | mm |
| Testing Height | 11.146 | 11.289 | mm |
| Void Ratio, e | 0.785 | 0.807 | - |
| Moisture content, ω | 20.4% | 28.9% | - |
| Degree of Saturation | 70.3% | 93.3% | - |
| Change in ω | - | 8.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.38 | cm |
| Primary Swell | - | 1.3% | % |
| Ultimate Swell | - | 2.9% | % |
| Volume | 22.59 | 22.88 | cm$^3$ |
| Change in Volume | - | 0.29 | cm$^3$ |
| Mass of Water Lost | - | 1.45 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.00% | %/log cycle | Primary Swell | 1.28% | Stress (psf) | 194.3 |
| Slope of Secondary Swelling | -0.30% | %/log cycle | Time to Swell (hr) | 2.97 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | SJ |

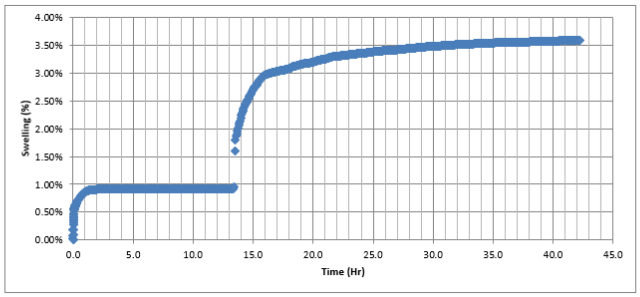
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.02 | g |
| Dry Unit Weight | 14.44 | $kN/m^3$ |
| Height of Sample | 10.196 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 10.45 | g's |
| Sample Height | - | 8.567 | mm |
| Testing Height | 10.156 | 10.250 | mm |
| Void Ratio, e | 0.834 | 0.851 | - |
| Moisture content, ω | 25.5% | 33.2% | - |
| Degree of Saturation | 82.5% | 99.6% | - |
| Change in ω | - | 7.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.42 | cm |
| Primary Swell | - | 0.9% | % |
| Ultimate Swell | - | 3.6% | % |
| Volume | 20.59 | 20.78 | $cm^3$ |
| Change in Volume | - | 0.19 | $cm^3$ |
| Mass of Water Lost | - | 2.24 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.26% | %/log cycle | Primary Swell | 0.92% | Stress (psf) | 290.6 |
| Slope of Secondary Swelling | 0.00% | %/log cycle | Time to Swell (hr) | 2.89 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | SJ |

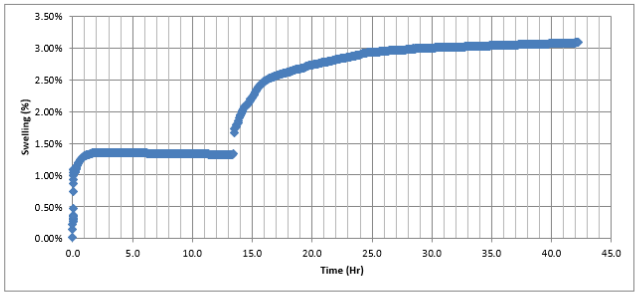
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.47 | g |
| Dry Unit Weight | 15.38 | $kN/m^3$ |
| Height of Sample | 9.815 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 10.55 | g's |
| Sample Height | - | 5.857 | mm |
| Testing Height | 9.782 | 9.915 | mm |
| Void Ratio, e | 0.722 | 0.746 | - |
| Moisture content, ω | 20.6% | 28.0% | - |
| Degree of Saturation | 76.8% | 97.5% | - |
| Change in ω | - | 7.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.68 | cm |
| Primary Swell | - | 1.4% | % |
| Ultimate Swell | - | 3.1% | % |
| Volume | 19.83 | 20.10 | $cm^3$ |
| Change in Volume | - | 0.27 | $cm^3$ |
| Mass of Water Lost | - | 1.65 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.25% | %/log cycle | Primary Swell | 1.36% | Stress (psf) | 295.7 |
| Slope of Secondary Swelling | -0.05% | %/log cycle | Time to Swell (hr) | 3.05 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | SJ |

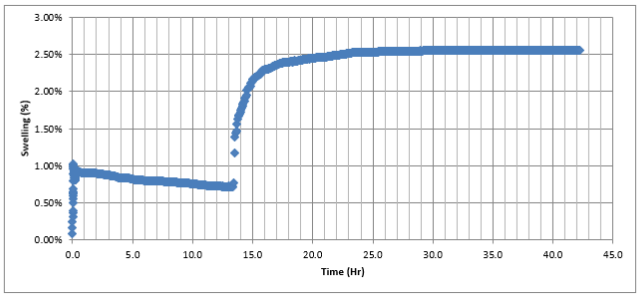
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.53 | g |
| Dry Unit Weight | 14.93 | kN/m$^3$ |
| Height of Sample | 9.901 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 10.35 | g's |
| Sample Height | - | 11.741 | mm |
| Testing Height | 9.860 | 9.946 | mm |
| Void Ratio, e | 0.774 | 0.790 | - |
| Moisture content, ω | 23.4% | 29.5% | - |
| Degree of Saturation | 81.6% | 97.1% | - |
| Change in ω | - | 6.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.14 | cm |
| Primary Swell | - | 0.9% | % |
| Ultimate Swell | - | 2.6% | % |
| Volume | 19.98 | 20.16 | cm$^3$ |
| Change in Volume | - | 0.17 | cm$^3$ |
| Mass of Water Lost | - | 1.63 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.05% | %/log cycle | Primary Swell | 0.87% | Stress (psf) | 477.3 |
| Slope of Secondary Swelling | -0.18% | %/log cycle | Time to Swell (hr) | 2.53 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/8/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | SJ |

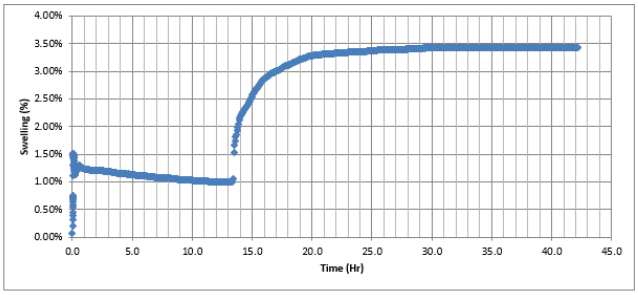
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 0-2FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.08 | g |
| Dry Unit Weight | 14.38 | kN/m$^3$ |
| Height of Sample | 9.733 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 10.55 | g's |
| Sample Height | - | 11.032 | mm |
| Testing Height | 9.694 | 9.810 | mm |
| Void Ratio, e | 0.841 | 0.863 | - |
| Moisture content, ω | 25.2% | 34.4% | - |
| Degree of Saturation | 81.0% | 100.0% | - |
| Change in ω | - | 9.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.63 | cm |
| Primary Swell | - | 1.2% | % |
| Ultimate Swell | - | 3.4% | % |
| Volume | 19.65 | 19.88 | cm$^3$ |
| Change in Volume | - | 0.23 | cm$^3$ |
| Mass of Water Lost | - | 1.72 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.02% | %/log cycle | Primary Swell | 1.20% | Stress (psf) | 489.3 |
| Slope of Secondary Swelling | -0.31% | %/log cycle | Time to Swell (hr) | 2.87 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/18/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | SJ |

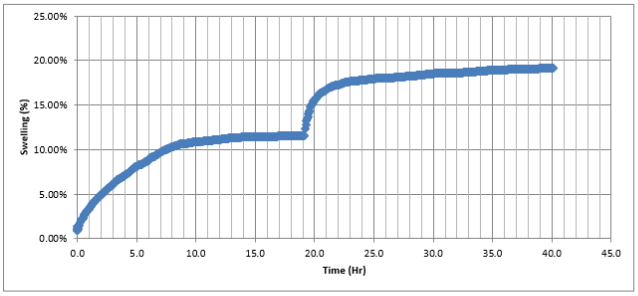
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.12 | g |
| Dry Unit Weight | 15.68 | $kN/m^3$ |
| Height of Sample | 11.339 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 11.95 | g's |
| Sample Height | - | 4.162 | mm |
| Testing Height | 11.309 | 12.568 | mm |
| Void Ratio, e | 0.689 | 0.878 | - |
| Moisture content, ω | 20.4% | 39.5% | - |
| Degree of Saturation | 80.1% | 100.0% | - |
| Change in ω | - | 19.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.35 | cm |
| Primary Swell | - | 11.1% | % |
| Ultimate Swell | - | 19.1% | % |
| Volume | 22.92 | 25.47 | $cm^3$ |
| Change in Volume | - | 2.55 | $cm^3$ |
| Mass of Water Lost | - | -695.46 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 6.29% | %/log cycle | Primary Swell | 11.14% | Stress (psf) | 182.9 |
| Slope of Secondary Swelling | 3.08% | %/log cycle | Time to Swell (hr) | 12.39 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/18/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | SJ |

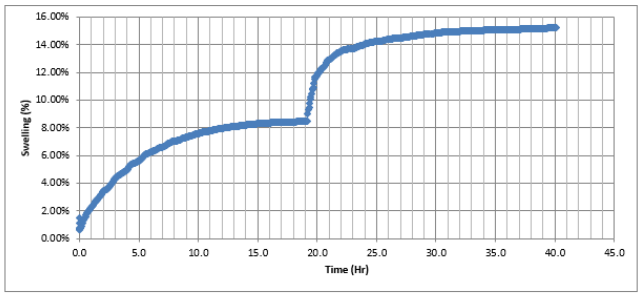
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.43 | g |
| Dry Unit Weight | 15.36 | $kN/m^3$ |
| Height of Sample | 11.090 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 11.84 | g's |
| Sample Height | - | 3.301 | mm |
| Testing Height | 11.053 | 12.074 | mm |
| Void Ratio, e | 0.724 | 0.884 | - |
| Moisture content, ω | 21.0% | 38.8% | - |
| Degree of Saturation | 78.1% | 100.0% | - |
| Change in ω | - | 17.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 3.11 | cm |
| Primary Swell | - | 9.2% | % |
| Ultimate Swell | - | 15.2% | % |
| Volume | 22.40 | 24.47 | $cm^3$ |
| Change in Volume | - | 2.07 | $cm^3$ |
| Mass of Water Lost | - | 4.72 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.41% | %/log cycle | Primary Swell | 9.24% | Stress (psf) | 181.8 |
| Slope of Secondary Swelling | 3.71% | %/log cycle | Time to Swell (hr) | 27.47 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/18/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | SJ |

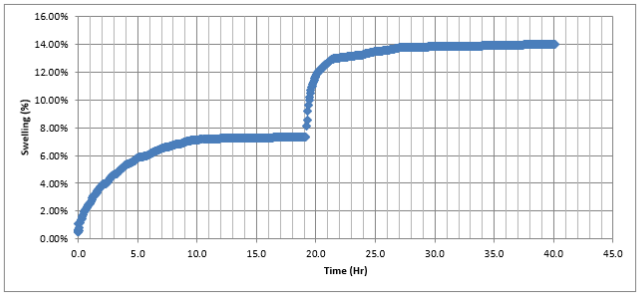
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.22 | g |
| Dry Unit Weight | 14.91 | kN/m$^3$ |
| Height of Sample | 11.501 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 11.95 | g's |
| Sample Height | - | 5.358 | mm |
| Testing Height | 11.459 | 12.279 | mm |
| Void Ratio, e | 0.777 | 0.904 | - |
| Moisture content, ω | 25.3% | 39.6% | - |
| Degree of Saturation | 87.9% | 100.0% | - |
| Change in ω | - | 14.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 2.96 | cm |
| Primary Swell | - | 7.2% | % |
| Ultimate Swell | - | 14.0% | % |
| Volume | 23.23 | 24.89 | cm$^3$ |
| Change in Volume | - | 1.66 | cm$^3$ |
| Mass of Water Lost | - | 4.63 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.95% | %/log cycle | Primary Swell | 7.16% | Stress (psf) | 277.6 |
| Slope of Secondary Swelling | 0.69% | %/log cycle | Time to Swell (hr) | 10.53 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/18/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | SJ |

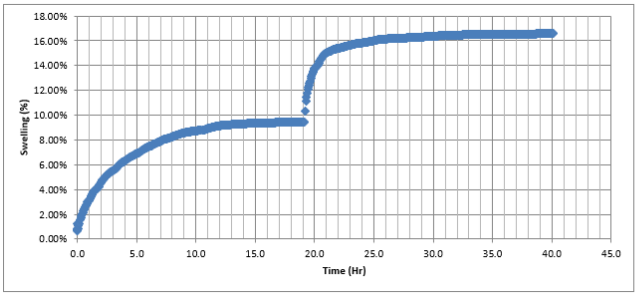
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.99 | g |
| Dry Unit Weight | 15.39 | kN/m$^3$ |
| Height of Sample | 10.876 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 12.10 | g's |
| Sample Height | - | 4.358 | mm |
| Testing Height | 10.855 | 11.821 | mm |
| Void Ratio, e | 0.721 | 0.874 | - |
| Moisture content, ω | 24.5% | 39.7% | - |
| Degree of Saturation | 91.9% | 100.0% | - |
| Change in ω | - | 15.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.24 | cm |
| Primary Swell | - | 8.9% | % |
| Ultimate Swell | - | 16.6% | % |
| Volume | 22.00 | 23.96 | cm$^3$ |
| Change in Volume | - | 1.96 | cm$^3$ |
| Mass of Water Lost | - | 8.45 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.93% | %/log cycle | Primary Swell | 8.89% | Stress (psf) | 278.3 |
| Slope of Secondary Swelling | 3.23% | %/log cycle | Time to Swell (hr) | 11.23 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/18/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | SJ |

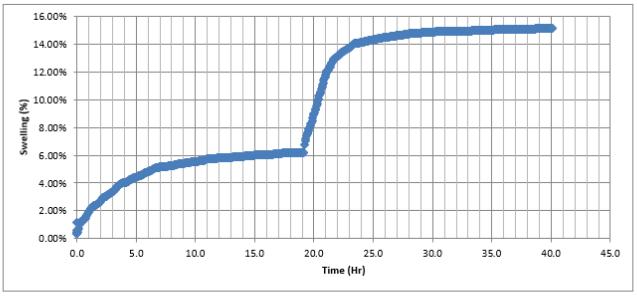
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 2-4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 47.04 | g |
| Dry Unit Weight | 16.72 | $kN/m^3$ |
| Height of Sample | 11.928 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 11.97 | g's |
| Sample Height | - | 9.818 | mm |
| Testing Height | 11.887 | 12.490 | mm |
| Void Ratio, e | 0.584 | 0.664 | - |
| Moisture content, ω | 14.5% | 31.9% | - |
| Degree of Saturation | 67.2% | 100.0% | - |
| Change in ω | - | 17.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.64 | cm |
| Primary Swell | - | 5.1% | % |
| Ultimate Swell | - | 15.1% | % |
| Volume | 24.09 | 25.32 | $cm^3$ |
| Change in Volume | - | 1.22 | $cm^3$ |
| Mass of Water Lost | - | 13.77 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.37% | %/log cycle | Primary Swell | 5.07% | Stress (psf) | 458.8 |
| Slope of Secondary Swelling | 2.51% | %/log cycle | Time to Swell (hr) | 6.57 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | SJ |

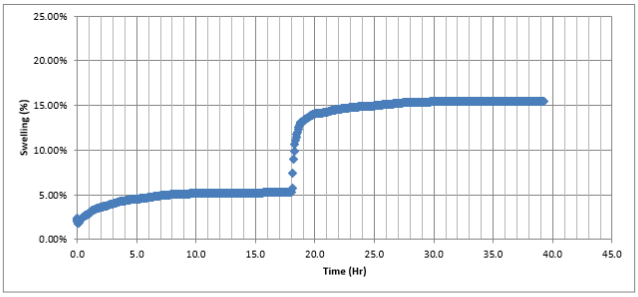
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.66 | g |
| Dry Unit Weight | 13.52 | $kN/m^3$ |
| Height of Sample | 9.992 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.18 | g's |
| Sample Height | - | 5.228 | mm |
| Testing Height | 10.003 | 10.518 | mm |
| Void Ratio, e | 0.959 | 1.060 | - |
| Moisture content, ω | 27.6% | 47.2% | - |
| Degree of Saturation | 77.8% | 100.0% | - |
| Change in ω | - | 19.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.51 | cm |
| Primary Swell | - | 5.2% | % |
| Ultimate Swell | - | 15.5% | % |
| Volume | 20.27 | 21.32 | $cm^3$ |
| Change in Volume | - | 1.04 | $cm^3$ |
| Mass of Water Lost | - | 2.41 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.85% | %/log cycle | Primary Swell | 5.15% | Stress (psf) | 332.5 |
| Slope of Secondary Swelling | 0.39% | %/log cycle | Time to Swell (hr) | 9.29 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | SJ |

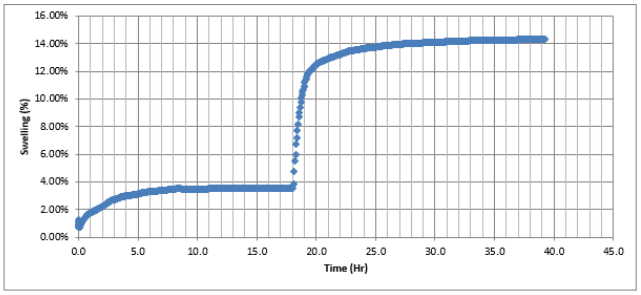
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.79 | g |
| Dry Unit Weight | 14.48 | $kN/m^3$ |
| Height of Sample | 9.972 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 24.89 | g's |
| Sample Height | - | 4.879 | mm |
| Testing Height | 9.971 | 10.319 | mm |
| Void Ratio, e | 0.830 | 0.894 | - |
| Moisture content, ω | 26.7% | 42.3% | - |
| Degree of Saturation | 87.0% | 100.0% | - |
| Change in ω | - | 15.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.30 | cm |
| Primary Swell | - | 3.5% | % |
| Ultimate Swell | - | 14.3% | % |
| Volume | 20.21 | 20.91 | $cm^3$ |
| Change in Volume | - | 0.71 | $cm^3$ |
| Mass of Water Lost | - | 2.91 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.46% | %/log cycle |
| Slope of Secondary Swelling | 0.15% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.49% |
| Time to Swell (hr) | 8.25 |

| | |
|---|---|
| Stress (psf) | 330.8 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | SJ |

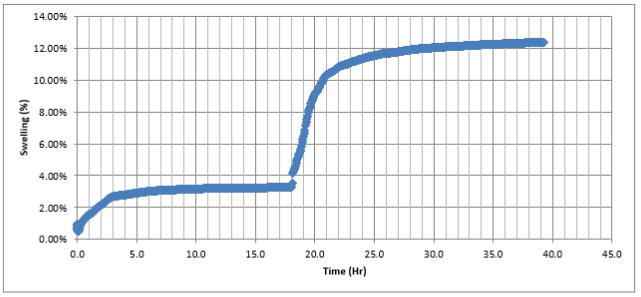
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.52 | g |
| Dry Unit Weight | 13.88 | $kN/m^3$ |
| Height of Sample | 9.947 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.47 | g's |
| Sample Height | - | 8.555 | mm |
| Testing Height | 9.952 | 10.254 | mm |
| Void Ratio, e | 0.908 | 0.966 | - |
| Moisture content, ω | 31.4% | 44.3% | - |
| Degree of Saturation | 93.5% | 100.0% | - |
| Change in ω | - | 12.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.45 | cm |
| Primary Swell | - | 3.0% | % |
| Ultimate Swell | - | 12.4% | % |
| Volume | 20.17 | 20.78 | $cm^3$ |
| Change in Volume | - | 0.61 | $cm^3$ |
| Mass of Water Lost | - | 3.36 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.55% | %/log cycle |
| Slope of Secondary Swelling | 0.50% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.04% |
| Time to Swell (hr) | 6.01 |

| | |
|---|---|
| Stress (psf) | 510.4 |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | SJ |

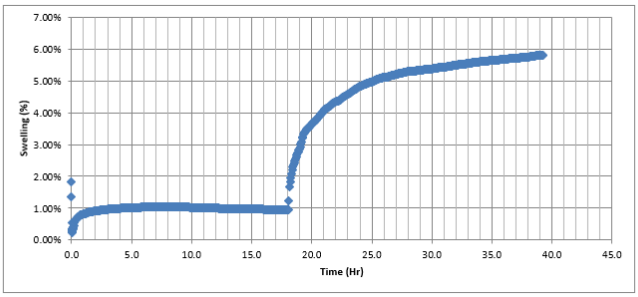
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.90 | g |
| Dry Unit Weight | 14.23 | kN/m$^3$ |
| Height of Sample | 9.682 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.41 | g's |
| Sample Height | - | 5.969 | mm |
| Testing Height | 9.705 | 9.807 | mm |
| Void Ratio, e | 0.862 | 0.881 | - |
| Moisture content, ω | 29.3% | 39.2% | - |
| Degree of Saturation | 91.9% | 100.0% | - |
| Change in ω | - | 9.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.53 | cm |
| Primary Swell | - | 1.1% | % |
| Ultimate Swell | - | 5.8% | % |
| Volume | 19.67 | 19.88 | cm$^3$ |
| Change in Volume | - | 0.21 | cm$^3$ |
| Mass of Water Lost | - | 2.60 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.40% | %/log cycle | Primary Swell | 1.05% | Stress (psf) | 507.0 |
| Slope of Secondary Swelling | -0.22% | %/log cycle | Time to Swell (hr) | 6.27 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | SJ |

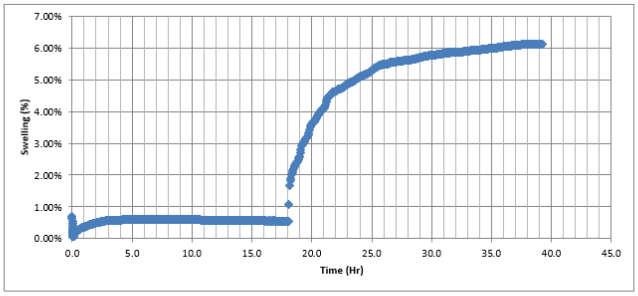
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.31 | g |
| Dry Unit Weight | 13.45 | kN/m$^3$ |
| Height of Sample | 10.511 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.30 | g's |
| Sample Height | - | 12.130 | mm |
| Testing Height | 10.547 | 10.613 | mm |
| Void Ratio, e | 0.970 | 0.982 | - |
| Moisture content, ω | 30.8% | 40.4% | - |
| Degree of Saturation | 85.6% | 100.0% | - |
| Change in ω | - | 9.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.24 | cm |
| Primary Swell | - | 0.6% | % |
| Ultimate Swell | - | 6.1% | % |
| Volume | 21.38 | 21.51 | cm$^3$ |
| Change in Volume | - | 0.13 | cm$^3$ |
| Mass of Water Lost | - | 2.66 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.32% | %/log cycle | Primary Swell | 0.63% | Stress (psf) | 830.1 |
| Slope of Secondary Swelling | -0.17% | %/log cycle | Time to Swell (hr) | 6.16 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | SJ |

SOIL Information

| Property | Informati |
|---|---|
| Soil | FM2 |
| Boring | B7 |
| Depth | 4-FT |
| Specific Gravity | 2.70 |
| Mass of Soil | 36.88 |
| Dry Unit Weight | 13.61 |
| Height of Sample | 10.119 |

TEST Results

| Property | Initial | |
|---|---|---|
| G-Level | - | 2 |
| Sample Height | - | 1 |
| Testing Height | 10.140 | 1 |
| Void Ratio, e | 0.946 | 0 |
| Moisture content, ω | 29.4% | 3 |
| Degree of Saturation | 83.8% | 9 |
| Change in ω | - | 1 |
| Overburden Mass | - | ( |
| Height of water | 4.16 | |
| Primary Swell | - | ( |
| Ultimate Swell | - | 6 |
| Volume | 20.55 | 2 |
| Change in Volume | - | ( |
| Mass of Water Lost | - | |

NOTES

8.00%

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SJ |

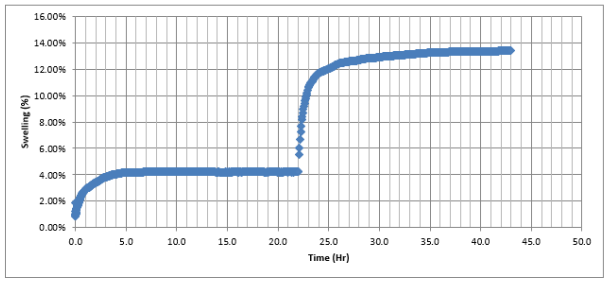
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.44 | g |
| Dry Unit Weight | 13.91 | kN/m$^3$ |
| Height of Sample | 9.891 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 42.19 | g's |
| Sample Height | - | 7.011 | mm |
| Testing Height | 9.836 | 10.248 | mm |
| Void Ratio, e | 0.905 | 0.985 | - |
| Moisture content, ω | 25.4% | 44.2% | - |
| Degree of Saturation | 75.8% | 100.0% | - |
| Change in ω | - | 18.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 2.83 | cm |
| Primary Swell | - | 4.2% | % |
| Ultimate Swell | - | 13.4% | % |
| Volume | 19.94 | 20.77 | cm$^3$ |
| Change in Volume | - | 0.83 | cm$^3$ |
| Mass of Water Lost | - | 41.18 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.84% | %/log cycle | Primary Swell | 4.19% | Stress (psf) | 421.0 |
| Slope of Secondary Swelling | 0.05% | %/log cycle | Time to Swell (hr) | 4.64 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SJ |

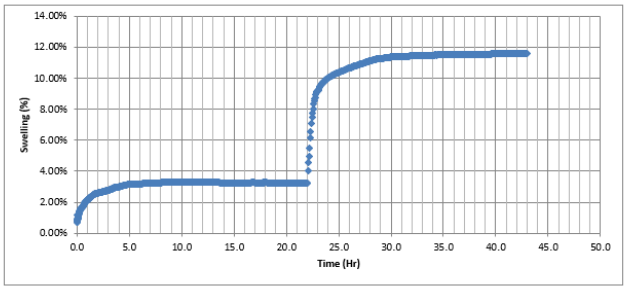
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.85 | g |
| Dry Unit Weight | 14.50 | kN/m$^3$ |
| Height of Sample | 9.860 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 42.51 | g's |
| Sample Height | - | 6.770 | mm |
| Testing Height | 9.810 | 10.129 | mm |
| Void Ratio, e | 0.827 | 0.886 | - |
| Moisture content, ω | 25.4% | 40.2% | - |
| Degree of Saturation | 82.9% | 100.0% | - |
| Change in ω | - | 14.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 2.85 | cm |
| Primary Swell | - | 3.3% | % |
| Ultimate Swell | - | 11.6% | % |
| Volume | 19.88 | 20.53 | cm$^3$ |
| Change in Volume | - | 0.65 | cm$^3$ |
| Mass of Water Lost | - | 34.67 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.30% | %/log cycle |
| Slope of Secondary Swelling | 0.03% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.25% |
| Time to Swell (hr) | 6.24 |

| | |
|---|---|
| Stress (psf) | 430.5 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SJ |

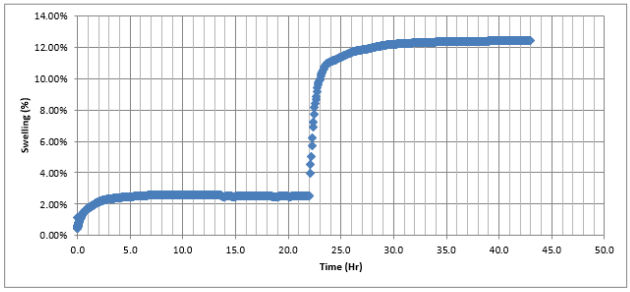
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.96 | g |
| Dry Unit Weight | 13.90 | kN/m$^3$ |
| Height of Sample | 9.916 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 42.99 | g's |
| Sample Height | - | 7.106 | mm |
| Testing Height | 9.855 | 10.102 | mm |
| Void Ratio, e | 0.906 | 0.953 | - |
| Moisture content, ω | 27.1% | 44.1% | - |
| Degree of Saturation | 80.7% | 100.0% | - |
| Change in ω | - | 17.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.33 | cm |
| Primary Swell | - | 2.5% | % |
| Ultimate Swell | - | 12.4% | % |
| Volume | 19.97 | 20.47 | cm$^3$ |
| Change in Volume | - | 0.50 | cm$^3$ |
| Mass of Water Lost | - | 8.31 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.12% | %/log cycle |
| Slope of Secondary Swelling | 0.01% | %/log cycle |

| | |
|---|---|
| Primary Swell | 2.51% |
| Time to Swell (hr) | 4.49 |

| | |
|---|---|
| Stress (psf) | 650.5 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SJ |

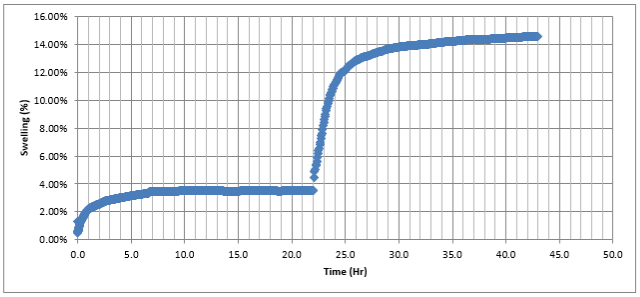
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.49 | g |
| Dry Unit Weight | 13.32 | kN/m$^3$ |
| Height of Sample | 10.089 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 42.50 | g's |
| Sample Height | - | 4.435 | mm |
| Testing Height | 10.019 | 10.368 | mm |
| Void Ratio, e | 0.989 | 1.058 | - |
| Moisture content, ω | 28.7% | 48.0% | - |
| Degree of Saturation | 78.4% | 100.0% | - |
| Change in ω | - | 19.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.05 | cm |
| Primary Swell | - | 3.5% | % |
| Ultimate Swell | - | 14.5% | % |
| Volume | 20.31 | 21.01 | cm$^3$ |
| Change in Volume | - | 0.71 | cm$^3$ |
| Mass of Water Lost | - | 5.68 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.42% | %/log cycle | Primary Swell | 3.49% | Stress (psf) | 642.6 |
| Slope of Secondary Swelling | 0.10% | %/log cycle | Time to Swell (hr) | 8.47 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SJ |

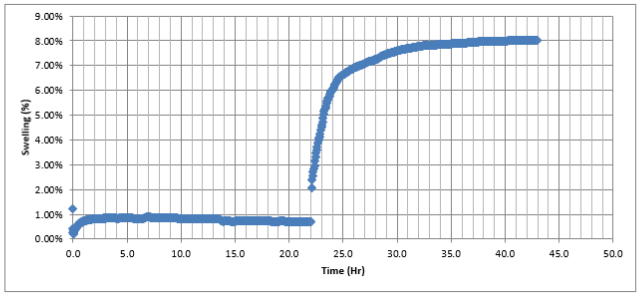
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.75 | g |
| Dry Unit Weight | 13.57 | kN/m$^3$ |
| Height of Sample | 9.799 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 43.00 | g's |
| Sample Height | - | 10.956 | mm |
| Testing Height | 9.747 | 9.832 | mm |
| Void Ratio, e | 0.952 | 0.969 | - |
| Moisture content, ω | 30.9% | 42.5% | - |
| Degree of Saturation | 87.5% | 100.0% | - |
| Change in ω | - | 11.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.29 | cm |
| Primary Swell | - | 0.9% | % |
| Ultimate Swell | - | 8.0% | % |
| Volume | 19.76 | 19.93 | cm$^3$ |
| Change in Volume | - | 0.17 | cm$^3$ |
| Mass of Water Lost | - | 11.37 | g |

NOTES:




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.33% | %/log cycle | Primary Swell | 0.86% | Stress (psf) | 1073.7 |
| Slope of Secondary Swelling | -0.20% | %/log cycle | Time to Swell (hr) | 3.99 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/11/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SJ |

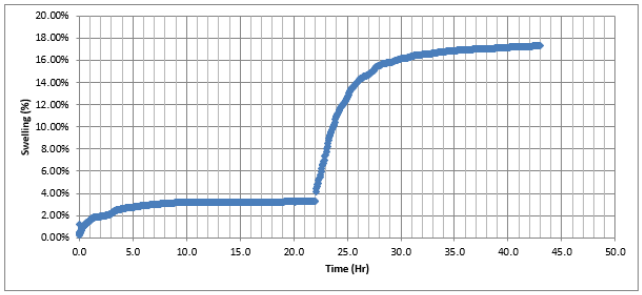
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 6-8 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.04 | g |
| Dry Unit Weight | 14.12 | kN/m$^3$ |
| Height of Sample | 9.794 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 42.80 | g's |
| Sample Height | - | 10.833 | mm |
| Testing Height | 9.701 | 10.000 | mm |
| Void Ratio, e | 0.875 | 0.933 | - |
| Moisture content, ω | 27.3% | 45.4% | - |
| Degree of Saturation | 84.2% | 100.0% | - |
| Change in ω | - | 18.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.20 | cm |
| Primary Swell | - | 3.1% | % |
| Ultimate Swell | - | 17.3% | % |
| Volume | 19.66 | 20.27 | cm$^3$ |
| Change in Volume | - | 0.61 | cm$^3$ |
| Mass of Water Lost | - | 7.93 | g |

| NOTES | Remolded |
|---|---|




| Slope of Primary Swelling | 1.48% | %/log cycle |
|---|---|---|

| Primary Swell | 3.08% |
|---|---|

| Stress (psf) | 1084.5 |
|---|---|

| Slope of Secondary Swelling | 0.43% | %/log cycle |
|---|---|---|

| Time to Swell (hr) | 7.42 |
|---|---|

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/17/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SJ |

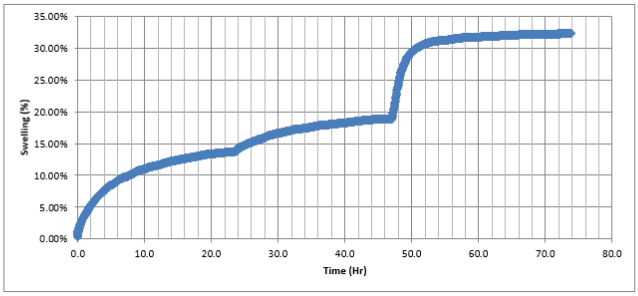
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.76 | g |
| Dry Unit Weight | 15.80 | kN/m$^3$ |
| Height of Sample | 11.501 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.43 | g's |
| Sample Height | - | 6.178 | mm |
| Testing Height | 11.456 | 13.017 | mm |
| Void Ratio, e | 0.677 | 0.905 | - |
| Moisture content, ω | 22.4% | 47.7% | - |
| Degree of Saturation | 89.3% | 100.0% | - |
| Change in ω | - | 25.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.44 | cm |
| Primary Swell | - | 13.6% | % |
| Ultimate Swell | - | 32.2% | % |
| Volume | 23.22 | 26.38 | cm$^3$ |
| Change in Volume | - | 3.16 | cm$^3$ |
| Mass of Water Lost | - | -246.47 | g |

| NOTES | |
|---|---|




| Slope of Primary Swelling | 6.88% | %/log cycle |
|---|---|---|

| Primary Swell | 13.63% |
|---|---|

| Stress (psf) | 316.6 |
|---|---|

| Slope of Secondary Swelling | 18.39% | %/log cycle |
|---|---|---|

| Time to Swell (hr) | 22.36 |
|---|---|

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/17/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SJ |

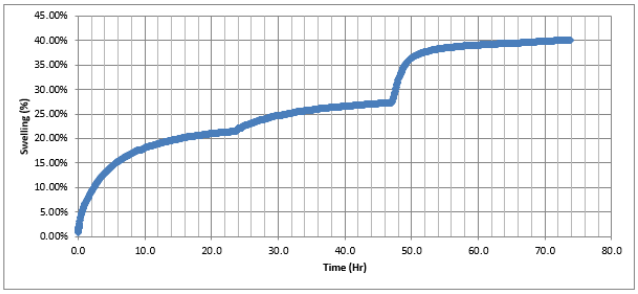
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 48.23 | g |
| Dry Unit Weight | 16.84 | kN/m$^3$ |
| Height of Sample | 11.699 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.38 | g's |
| Sample Height | - | 6.347 | mm |
| Testing Height | 11.655 | 14.245 | mm |
| Void Ratio, e | 0.573 | 0.923 | - |
| Moisture content, ω | 19.0% | 48.2% | - |
| Degree of Saturation | 89.3% | 100.0% | - |
| Change in ω | - | 29.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.09 | 2.19 | cm |
| Primary Swell | - | 22.2% | % |
| Ultimate Swell | - | 40.1% | % |
| Volume | 23.62 | 28.87 | cm$^3$ |
| Change in Volume | - | 5.25 | cm$^3$ |
| Mass of Water Lost | - | 26.16 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 10.69% | %/log cycle | Primary Swell | 22.22% | Stress (psf) | 319.5 |
| Slope of Secondary Swelling | 20.80% | %/log cycle | Time to Swell (hr) | 24.60 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/17/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SJ |

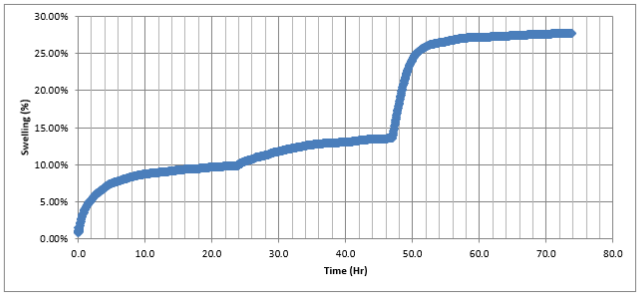
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.86 | g |
| Dry Unit Weight | 16.29 | kN/m$^3$ |
| Height of Sample | 11.130 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.45 | g's |
| Sample Height | - | 8.067 | mm |
| Testing Height | 11.075 | 12.214 | mm |
| Void Ratio, e | 0.626 | 0.793 | - |
| Moisture content, ω | 17.7% | 45.7% | - |
| Degree of Saturation | 76.2% | 100.0% | - |
| Change in ω | - | 28.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 2.48 | cm |
| Primary Swell | - | 10.3% | % |
| Ultimate Swell | - | 27.7% | % |
| Volume | 22.45 | 24.76 | cm$^3$ |
| Change in Volume | - | 2.31 | cm$^3$ |
| Mass of Water Lost | - | 20.86 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.47% | %/log cycle | Primary Swell | 10.29% | Stress (psf) | 473.4 |
| Slope of Secondary Swelling | 13.79% | %/log cycle | Time to Swell (hr) | 25.12 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/17/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SJ |

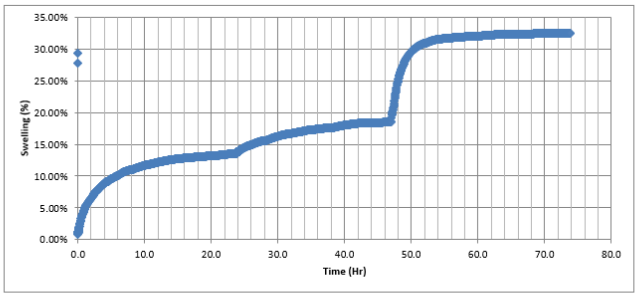
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.46 | g |
| Dry Unit Weight | 15.74 | $kN/m^3$ |
| Height of Sample | 10.937 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.38 | g's |
| Sample Height | - | 5.656 | mm |
| Testing Height | 10.905 | 12.448 | mm |
| Void Ratio, e | 0.682 | 0.920 | - |
| Moisture content, ω | 28.2% | 47.9% | - |
| Degree of Saturation | 100.0% | 100.0% | - |
| Change in ω | - | 19.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 2.83 | cm |
| Primary Swell | - | 14.1% | % |
| Ultimate Swell | - | 32.5% | % |
| Volume | 22.10 | 25.23 | $cm^3$ |
| Change in Volume | - | 3.13 | $cm^3$ |
| Mass of Water Lost | - | 15.68 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 6.44% | %/log cycle | Primary Swell | 14.14% | Stress (psf) | 467.1 |
| Slope of Secondary Swelling | 18.95% | %/log cycle | Time to Swell (hr) | 25.02 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/17/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SJ |

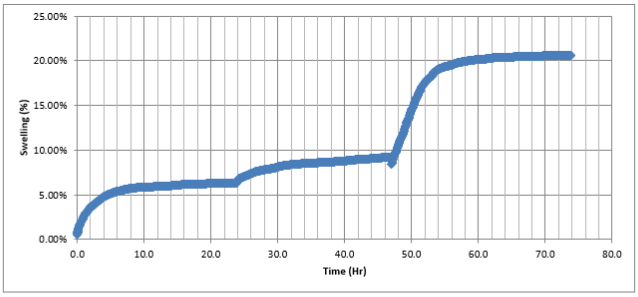
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.14 | g |
| Dry Unit Weight | 15.17 | $kN/m^3$ |
| Height of Sample | 10.856 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 50.86 | g's |
| Sample Height | - | 12.179 | mm |
| Testing Height | 10.821 | 11.549 | mm |
| Void Ratio, e | 0.746 | 0.863 | - |
| Moisture content, ω | 27.2% | 46.0% | - |
| Degree of Saturation | 98.4% | 100.0% | - |
| Change in ω | - | 18.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 2.02 | cm |
| Primary Swell | - | 6.7% | % |
| Ultimate Swell | - | 20.6% | % |
| Volume | 21.93 | 23.41 | $cm^3$ |
| Change in Volume | - | 1.48 | $cm^3$ |
| Mass of Water Lost | - | 28.72 | g |

NOTES:




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.95% | %/log cycle | Primary Swell | 6.73% | Stress (psf) | 759.5 |
| Slope of Secondary Swelling | 9.87% | %/log cycle | Time to Swell (hr) | 24.60 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/17/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SJ |

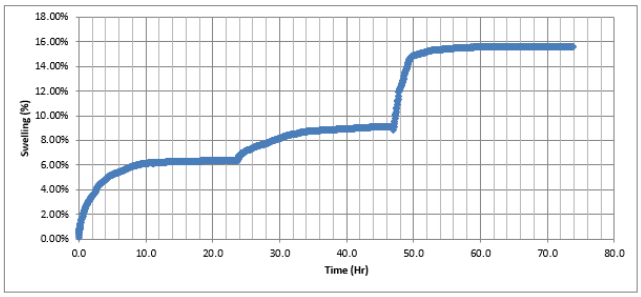
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B7 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.64 | g |
| Dry Unit Weight | 15.79 | kN/m$^3$ |
| Height of Sample | 11.420 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 51.38 | g's |
| Sample Height | - | 13.016 | mm |
| Testing Height | 11.376 | 12.175 | mm |
| Void Ratio, e | 0.677 | 0.795 | - |
| Moisture content, ω | 25.6% | 40.1% | - |
| Degree of Saturation | 100.0% | 100.0% | - |
| Change in ω | - | 14.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.08 | 2.45 | cm |
| Primary Swell | - | 7.0% | % |
| Ultimate Swell | - | 15.6% | % |
| Volume | 23.06 | 24.68 | cm$^3$ |
| Change in Volume | - | 1.62 | cm$^3$ |
| Mass of Water Lost | - | 21.74 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.18% | %/log cycle | Primary Swell | 7.02% | Stress (psf) | 780.9 |
| Slope of Secondary Swelling | 10.13% | %/log cycle | Time to Swell (hr) | 25.62 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/28/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SJ |

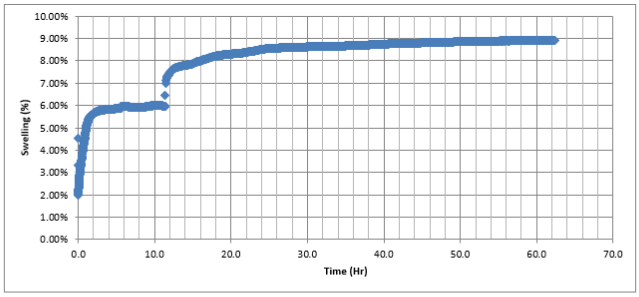
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.42 | g |
| Dry Unit Weight | 13.50 | kN/m$^3$ |
| Height of Sample | 10.800 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 17.80 | g's |
| Sample Height | - | 5.652 | mm |
| Testing Height | 10.763 | 11.387 | mm |
| Void Ratio, e | 0.963 | 1.077 | - |
| Moisture content, ω | 24.7% | 43.6% | - |
| Degree of Saturation | 69.3% | 100.0% | - |
| Change in ω | - | 18.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.23 | cm |
| Primary Swell | - | 5.8% | % |
| Ultimate Swell | - | 8.9% | % |
| Volume | 21.81 | 23.08 | cm$^3$ |
| Change in Volume | - | 1.27 | cm$^3$ |
| Mass of Water Lost | - | 4.16 | g |

NOTES:




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.17% | %/log cycle | Primary Swell | 5.80% | Stress (psf) | 162.1 |
| Slope of Secondary Swelling | 0.32% | %/log cycle | Time to Swell (hr) | 3.34 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/28/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SJ |

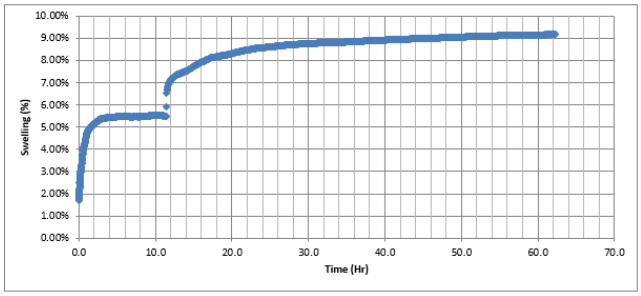
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.10 | g |
| Dry Unit Weight | 14.19 | kN/m$^3$ |
| Height of Sample | 10.998 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 17.95 | g's |
| Sample Height | - | 5.375 | mm |
| Testing Height | 10.968 | 11.563 | mm |
| Void Ratio, e | 0.867 | 0.968 | - |
| Moisture content, ω | 21.6% | 38.3% | - |
| Degree of Saturation | 67.3% | 99.6% | - |
| Change in ω | - | 16.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.48 | cm |
| Primary Swell | - | 5.4% | % |
| Ultimate Swell | - | 9.2% | % |
| Volume | 22.23 | 23.44 | cm$^3$ |
| Change in Volume | - | 1.21 | cm$^3$ |
| Mass of Water Lost | - | 3.72 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.01% | %/log cycle | Primary Swell | 5.43% | Stress (psf) | 166.0 |
| Slope of Secondary Swelling | 0.17% | %/log cycle | Time to Swell (hr) | 3.44 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/28/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SJ |

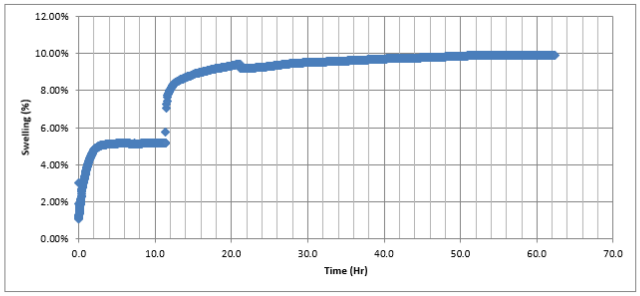
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.35 | g |
| Dry Unit Weight | 14.12 | kN/m$^3$ |
| Height of Sample | 10.729 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 17.75 | g's |
| Sample Height | - | 7.842 | mm |
| Testing Height | 10.678 | 11.223 | mm |
| Void Ratio, e | 0.876 | 0.972 | - |
| Moisture content, ω | 23.2% | 39.6% | - |
| Degree of Saturation | 71.3% | 100.0% | - |
| Change in ω | - | 16.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.19 | cm |
| Primary Swell | - | 5.1% | % |
| Ultimate Swell | - | 9.9% | % |
| Volume | 21.64 | 22.75 | cm$^3$ |
| Change in Volume | - | 1.11 | cm$^3$ |
| Mass of Water Lost | - | 3.58 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.30% | %/log cycle | Primary Swell | 5.11% | Stress (psf) | 245.7 |
| Slope of Secondary Swelling | 0.11% | %/log cycle | Time to Swell (hr) | 3.45 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/28/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SJ |

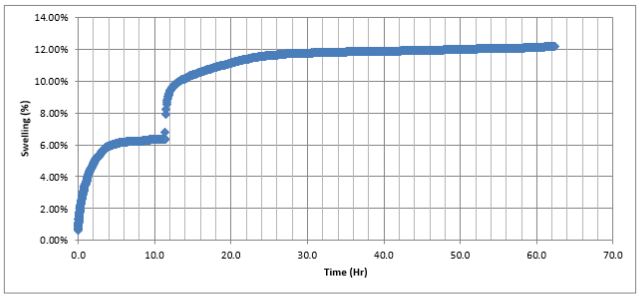
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.59 | g |
| Dry Unit Weight | 14.90 | kN/m$^3$ |
| Height of Sample | 10.927 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 17.95 | g's |
| Sample Height | - | 5.219 | mm |
| Testing Height | 10.888 | 11.532 | mm |
| Void Ratio, e | 0.778 | 0.883 | - |
| Moisture content, ω | 21.1% | 35.7% | - |
| Degree of Saturation | 73.3% | 97.0% | - |
| Change in ω | - | 14.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.47 | cm |
| Primary Swell | - | 5.9% | % |
| Ultimate Swell | - | 12.1% | % |
| Volume | 22.07 | 23.37 | cm$^3$ |
| Change in Volume | - | 1.31 | cm$^3$ |
| Mass of Water Lost | - | 3.94 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.83% | %/log cycle | Primary Swell | 5.92% | Stress (psf) | 249.4 |
| Slope of Secondary Swelling | 1.05% | %/log cycle | Time to Swell (hr) | 4.06 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/28/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SJ |

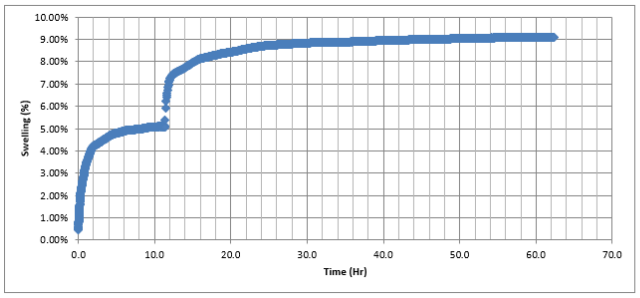
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.28 | g |
| Dry Unit Weight | 14.53 | kN/m$^3$ |
| Height of Sample | 11.044 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 17.63 | g's |
| Sample Height | - | 12.110 | mm |
| Testing Height | 11.008 | 11.515 | mm |
| Void Ratio, e | 0.823 | 0.907 | - |
| Moisture content, ω | 21.9% | 36.1% | - |
| Degree of Saturation | 71.9% | 98.6% | - |
| Change in ω | - | 14.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.79 | cm |
| Primary Swell | - | 4.6% | % |
| Ultimate Swell | - | 9.1% | % |
| Volume | 22.31 | 23.34 | cm$^3$ |
| Change in Volume | - | 1.03 | cm$^3$ |
| Mass of Water Lost | - | 5.20 | g |

NOTES:




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.23% | %/log cycle | Primary Swell | 4.61% | Stress (psf) | 403.3 |
| Slope of Secondary Swelling | 1.13% | %/log cycle | Time to Swell (hr) | 3.73 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/28/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SJ |

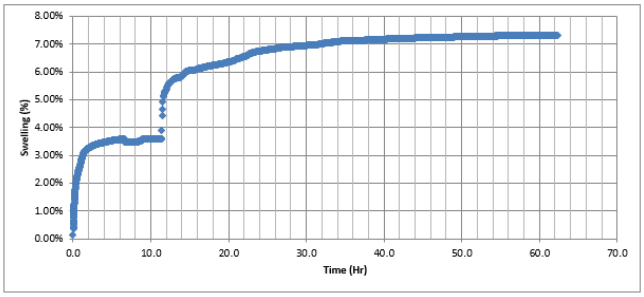
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.13 | g |
| Dry Unit Weight | 15.41 | $kN/m^3$ |
| Height of Sample | 11.186 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 17.95 | g's |
| Sample Height | - | 12.095 | mm |
| Testing Height | 11.159 | 11.546 | mm |
| Void Ratio, e | 0.718 | 0.778 | - |
| Moisture content, ω | 18.5% | 30.7% | - |
| Degree of Saturation | 69.7% | 98.1% | - |
| Change in ω | - | 12.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 3.47 | cm |
| Primary Swell | - | 3.5% | % |
| Ultimate Swell | - | 7.3% | % |
| Volume | 22.62 | 23.40 | $cm^3$ |
| Change in Volume | - | 0.78 | $cm^3$ |
| Mass of Water Lost | - | 3.54 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.59% | %/log cycle | Primary Swell | 3.46% | Stress (psf) | 413.4 |
| Slope of Secondary Swelling | 0.18% | %/log cycle | Time to Swell (hr) | 3.52 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | SJ |

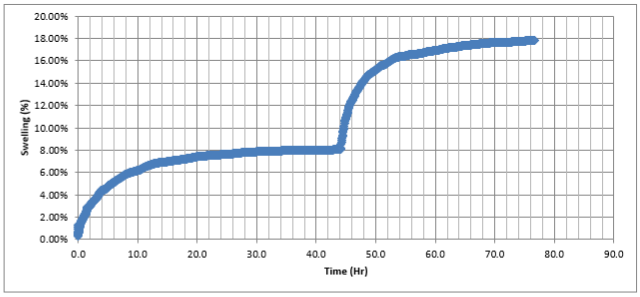
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.72 | g |
| Dry Unit Weight | 14.35 | $kN/m^3$ |
| Height of Sample | 11.019 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 53.53 | g's |
| Sample Height | - | 3.746 | mm |
| Testing Height | 10.988 | 11.812 | mm |
| Void Ratio, e | 0.846 | 0.984 | - |
| Moisture content, ω | 28.1% | 45.8% | - |
| Degree of Saturation | 89.6% | 100.0% | - |
| Change in ω | - | 17.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 2.88 | cm |
| Primary Swell | - | 7.5% | % |
| Ultimate Swell | - | 17.8% | % |
| Volume | 22.27 | 23.94 | $cm^3$ |
| Change in Volume | - | 1.67 | $cm^3$ |
| Mass of Water Lost | - | 18.60 | g |

NOTES:




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.57% | %/log cycle | Primary Swell | 7.50% | Stress (psf) | 338.3 |
| Slope of Secondary Swelling | 1.79% | %/log cycle | Time to Swell (hr) | 21.47 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | SJ |

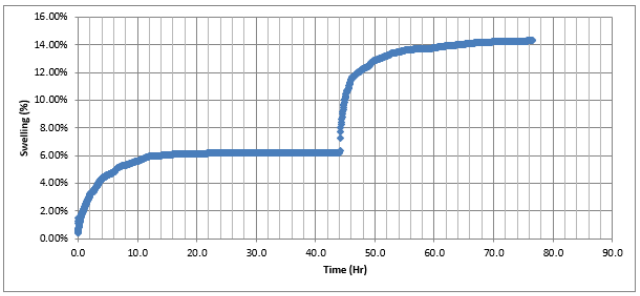
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.41 | g |
| Dry Unit Weight | 14.21 | $kN/m^3$ |
| Height of Sample | 10.866 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 53.04 | g's |
| Sample Height | - | 3.337 | mm |
| Testing Height | 10.823 | 11.489 | mm |
| Void Ratio, e | 0.864 | 0.979 | - |
| Moisture content, ω | 27.2% | 44.1% | - |
| Degree of Saturation | 84.9% | 100.0% | - |
| Change in ω | - | 16.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 2.90 | cm |
| Primary Swell | - | 6.1% | % |
| Ultimate Swell | - | 14.3% | % |
| Volume | 21.94 | 23.29 | $cm^3$ |
| Change in Volume | - | 1.35 | $cm^3$ |
| Mass of Water Lost | - | 10.60 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.93% | %/log cycle | Primary Swell | 6.14% | Stress (psf) | 334.3 |
| Slope of Secondary Swelling | 0.22% | %/log cycle | Time to Swell (hr) | 17.24 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | SJ |

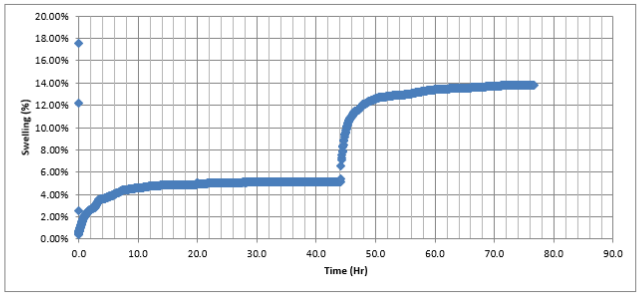
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.81 | g |
| Dry Unit Weight | 14.48 | $kN/m^3$ |
| Height of Sample | 10.820 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 54.16 | g's |
| Sample Height | - | 4.810 | mm |
| Testing Height | 10.776 | 11.313 | mm |
| Void Ratio, e | 0.829 | 0.920 | - |
| Moisture content, ω | 26.6% | 42.1% | - |
| Degree of Saturation | 86.6% | 100.0% | - |
| Change in ω | - | 15.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 2.92 | cm |
| Primary Swell | - | 5.0% | % |
| Ultimate Swell | - | 13.8% | % |
| Volume | 21.84 | 22.93 | $cm^3$ |
| Change in Volume | - | 1.09 | $cm^3$ |
| Mass of Water Lost | - | 17.89 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.22% | %/log cycle | Primary Swell | 4.98% | Stress (psf) | 516.9 |
| Slope of Secondary Swelling | 0.51% | %/log cycle | Time to Swell (hr) | 19.14 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | SJ |

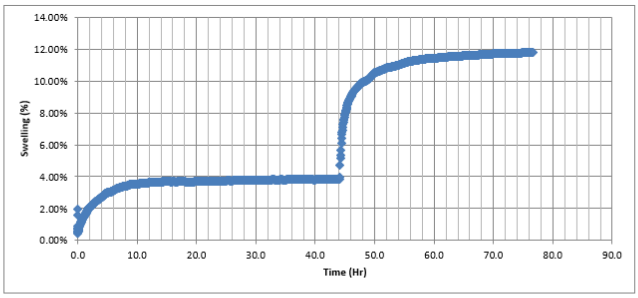
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.98 | g |
| Dry Unit Weight | 14.29 | $kN/m^3$ |
| Height of Sample | 10.912 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 53.76 | g's |
| Sample Height | - | 4.259 | mm |
| Testing Height | 10.853 | 11.247 | mm |
| Void Ratio, e | 0.854 | 0.921 | - |
| Moisture content, ω | 24.8% | 40.8% | - |
| Degree of Saturation | 78.4% | 100.0% | - |
| Change in ω | - | 16.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.65 | cm |
| Primary Swell | - | 3.6% | % |
| Ultimate Swell | - | 11.8% | % |
| Volume | 22.00 | 22.80 | $cm^3$ |
| Change in Volume | - | 0.80 | $cm^3$ |
| Mass of Water Lost | - | 21.11 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.66% | %/log cycle | Primary Swell | 3.63% | Stress (psf) | 511.2 |
| Slope of Secondary Swelling | 0.46% | %/log cycle | Time to Swell (hr) | 15.69 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | SJ |

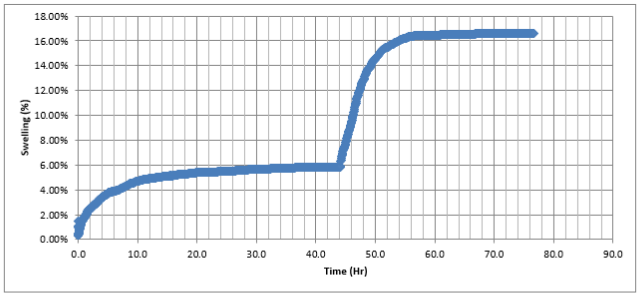
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.49 | g |
| Dry Unit Weight | 14.79 | $kN/m^3$ |
| Height of Sample | 10.729 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 54.15 | g's |
| Sample Height | - | 8.221 | mm |
| Testing Height | 10.688 | 11.250 | mm |
| Void Ratio, e | 0.791 | 0.886 | - |
| Moisture content, ω | 27.1% | 42.9% | - |
| Degree of Saturation | 92.4% | 100.0% | - |
| Change in ω | - | 15.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 2.22 | cm |
| Primary Swell | - | 5.3% | % |
| Ultimate Swell | - | 16.6% | % |
| Volume | 21.66 | 22.80 | $cm^3$ |
| Change in Volume | - | 1.14 | $cm^3$ |
| Mass of Water Lost | - | 24.90 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.54% | %/log cycle | Primary Swell | 5.26% | Stress (psf) | 863.4 |
| Slope of Secondary Swelling | 1.47% | %/log cycle | Time to Swell (hr) | 17.33 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | SJ |

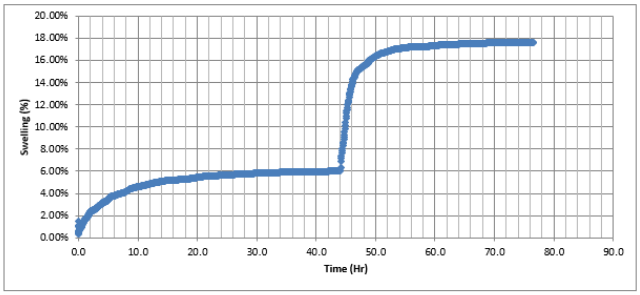
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM2 | |
| Boring | B8 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.36 | g |
| Dry Unit Weight | 14.36 | kN/m$^3$ |
| Height of Sample | 10.693 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 53.64 | g's |
| Sample Height | - | 7.986 | mm |
| Testing Height | 10.632 | 11.228 | mm |
| Void Ratio, e | 0.845 | 0.948 | - |
| Moisture content, ω | 28.0% | 45.6% | - |
| Degree of Saturation | 89.4% | 100.0% | - |
| Change in ω | - | 17.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 2.26 | cm |
| Primary Swell | - | 5.6% | % |
| Ultimate Swell | - | 17.7% | % |
| Volume | 21.55 | 22.76 | cm$^3$ |
| Change in Volume | - | 1.21 | cm$^3$ |
| Mass of Water Lost | - | 25.23 | g |

NOTES: Remolded




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.69% | %/log cycle | Primary Swell | 5.61% | Stress (psf) | 841.9 |
| Slope of Secondary Swelling | 1.48% | %/log cycle | Time to Swell (hr) | 23.22 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | SHIVANGI |

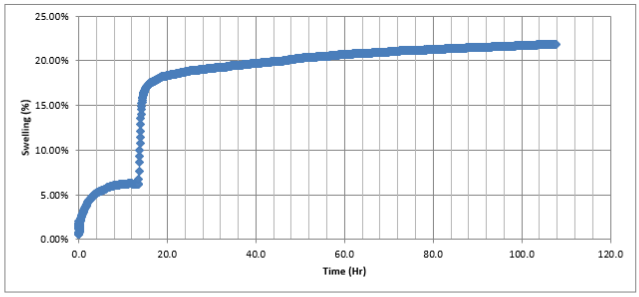
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B8 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.91 | g |
| Dry Unit Weight | 14.39 | kN/m$^3$ |
| Height of Sample | 11.826 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.06 | g's |
| Sample Height | - | 6.453 | mm |
| Testing Height | 11.774 | 12.475 | mm |
| Void Ratio, e | 0.840 | 0.950 | - |
| Moisture content, ω | 28.3% | 47.2% | - |
| Degree of Saturation | 90.8% | 100.0% | - |
| Change in ω | - | 18.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.01 | cm |
| Primary Swell | - | 5.9% | % |
| Ultimate Swell | - | 21.8% | % |
| Volume | 23.86 | 25.28 | cm$^3$ |
| Change in Volume | - | 1.42 | cm$^3$ |
| Mass of Water Lost | - | 6.65 | g |

NOTES:




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.62% | %/log cycle | Primary Swell | 5.95% | Stress (psf) | 522.5 |
| Slope of Secondary Swelling | 2.01% | %/log cycle | Time to Swell (hr) | 7.71 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | SHIVANGI |

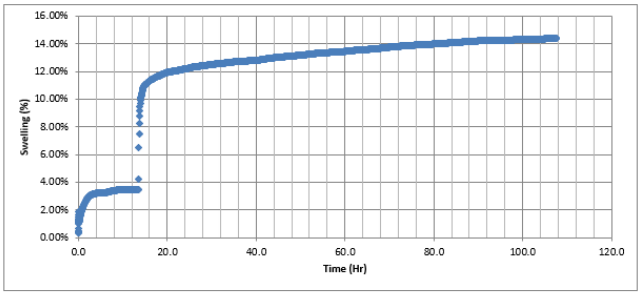
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B8 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.11 | g |
| Dry Unit Weight | 14.90 | $kN/m^3$ |
| Height of Sample | 11.857 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.28 | g's |
| Sample Height | - | 6.200 | mm |
| Testing Height | 11.816 | 12.189 | mm |
| Void Ratio, e | 0.777 | 0.834 | - |
| Moisture content, ω | 26.7% | 40.3% | - |
| Degree of Saturation | 92.9% | 100.0% | - |
| Change in ω | - | 13.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.42 | cm |
| Primary Swell | - | 3.2% | % |
| Ultimate Swell | - | 14.4% | % |
| Volume | 23.95 | 24.70 | $cm^3$ |
| Change in Volume | - | 0.75 | $cm^3$ |
| Mass of Water Lost | - | 4.58 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.35% | %/log cycle | Primary Swell | 3.15% | Stress (psf) | 529.4 |
| Slope of Secondary Swelling | 0.84% | %/log cycle | Time to Swell (hr) | 4.50 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | SHIVANGI |

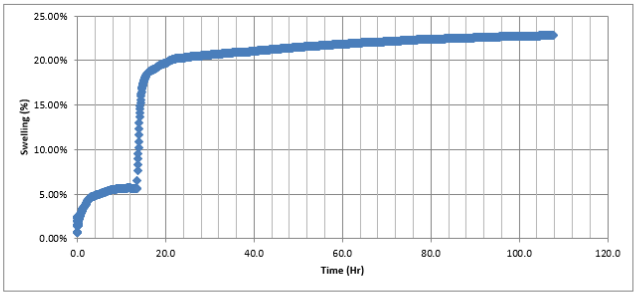
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B8 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.86 | g |
| Dry Unit Weight | 14.47 | $kN/m^3$ |
| Height of Sample | 10.744 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.09 | g's |
| Sample Height | - | 7.674 | mm |
| Testing Height | 10.686 | 11.241 | mm |
| Void Ratio, e | 0.830 | 0.925 | - |
| Moisture content, ω | 27.9% | 47.6% | - |
| Degree of Saturation | 90.7% | 100.0% | - |
| Change in ω | - | 19.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.09 | cm |
| Primary Swell | - | 5.2% | % |
| Ultimate Swell | - | 22.8% | % |
| Volume | 21.66 | 22.78 | $cm^3$ |
| Change in Volume | - | 1.13 | $cm^3$ |
| Mass of Water Lost | - | 5.50 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.32% | %/log cycle | Primary Swell | 5.20% | Stress (psf) | 767.5 |
| Slope of Secondary Swelling | 1.86% | %/log cycle | Time to Swell (hr) | 5.97 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | SHIVANGI |

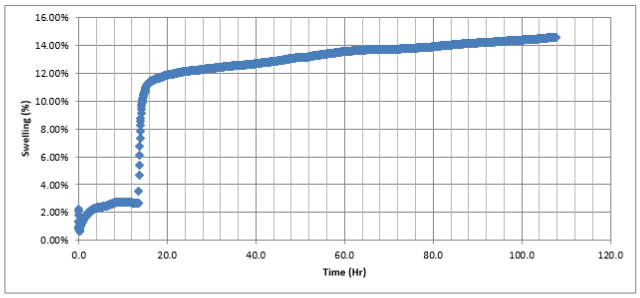
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B8 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.13 | g |
| Dry Unit Weight | 13.74 | $kN/m^3$ |
| Height of Sample | 10.922 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.28 | g's |
| Sample Height | - | 5.037 | mm |
| Testing Height | 10.864 | 11.175 | mm |
| Void Ratio, e | 0.927 | 0.982 | - |
| Moisture content, ω | 26.8% | 44.8% | - |
| Degree of Saturation | 78.2% | 100.0% | - |
| Change in ω | - | 17.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.43 | cm |
| Primary Swell | - | 2.9% | % |
| Ultimate Swell | - | 14.5% | % |
| Volume | 22.02 | 22.65 | $cm^3$ |
| Change in Volume | - | 0.63 | $cm^3$ |
| Mass of Water Lost | - | 5.24 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.13% | %/log cycle | Primary Swell | 2.86% | Stress (psf) | 777.8 |
| Slope of Secondary Swelling | 1.22% | %/log cycle | Time to Swell (hr) | 13.01 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | SHIVANGI |

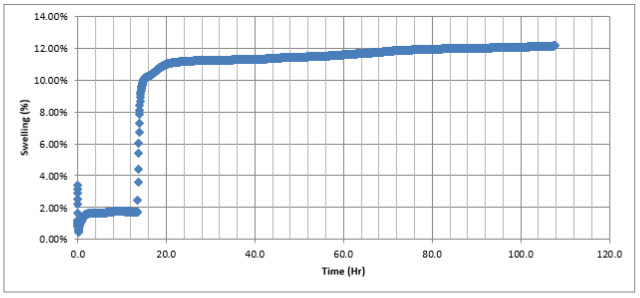
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B8 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.03 | g |
| Dry Unit Weight | 14.40 | $kN/m^3$ |
| Height of Sample | 10.719 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 24.81 | g's |
| Sample Height | - | 11.760 | mm |
| Testing Height | 10.661 | 10.835 | mm |
| Void Ratio, e | 0.839 | 0.869 | - |
| Moisture content, ω | 26.2% | 40.3% | - |
| Degree of Saturation | 84.3% | 100.0% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 2.80 | cm |
| Primary Swell | - | 1.6% | % |
| Ultimate Swell | - | 12.1% | % |
| Volume | 21.61 | 21.96 | $cm^3$ |
| Change in Volume | - | 0.35 | $cm^3$ |
| Mass of Water Lost | - | 9.03 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.72% | %/log cycle | Primary Swell | 1.63% | Stress (psf) | 1256.5 |
| Slope of Secondary Swelling | 0.34% | %/log cycle | Time to Swell (hr) | 4.71 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/10/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | SHIVANGI |

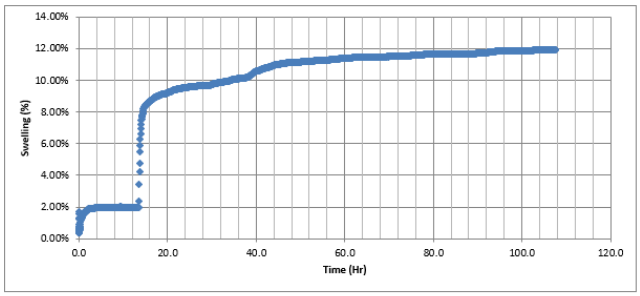
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B8 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.49 | g |
| Dry Unit Weight | 14.23 | kN/m$^3$ |
| Height of Sample | 10.917 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 25.28 | g's |
| Sample Height | - | 11.705 | mm |
| Testing Height | 10.877 | 11.089 | mm |
| Void Ratio, e | 0.862 | 0.898 | - |
| Moisture content, ω | 26.6% | 39.8% | - |
| Degree of Saturation | 83.5% | 99.2% | - |
| Change in ω | - | 13.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.43 | cm |
| Primary Swell | - | 1.9% | % |
| Ultimate Swell | - | 12.0% | % |
| Volume | 22.05 | 22.48 | cm$^3$ |
| Change in Volume | - | 0.43 | cm$^3$ |
| Mass of Water Lost | - | 5.45 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.88% | %/log cycle | Primary Swell | 1.94% | Stress (psf) | 1282.8 |
| Slope of Secondary Swelling | 0.19% | %/log cycle | Time to Swell (hr) | 5.24 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | Shivangi |

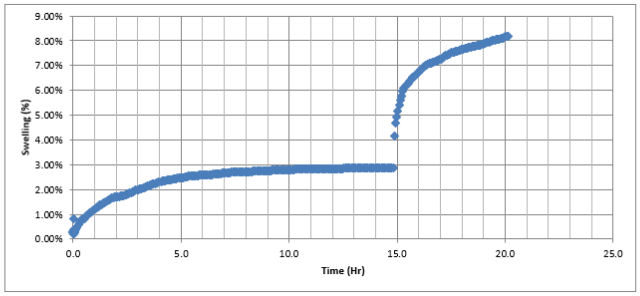
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.29 | g |
| Dry Unit Weight | 14.42 | kN/m$^3$ |
| Height of Sample | 10.734 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 20.09 | g's |
| Sample Height | - | 5.939 | mm |
| Testing Height | 10.688 | 10.977 | mm |
| Void Ratio, e | 0.837 | 0.887 | - |
| Moisture content, ω | 26.5% | 37.1% | - |
| Degree of Saturation | 85.6% | 100.0% | - |
| Change in ω | - | 10.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.36 | cm |
| Primary Swell | - | 2.7% | % |
| Ultimate Swell | - | 8.2% | % |
| Volume | 21.66 | 22.25 | cm$^3$ |
| Change in Volume | - | 0.59 | cm$^3$ |
| Mass of Water Lost | - | 4.53 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.68% | %/log cycle | Primary Swell | 2.71% | Stress (psf) | 173.1 |
| Slope of Secondary Swelling | 0.65% | %/log cycle | Time to Swell (hr) | 7.49 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | Shivangi |

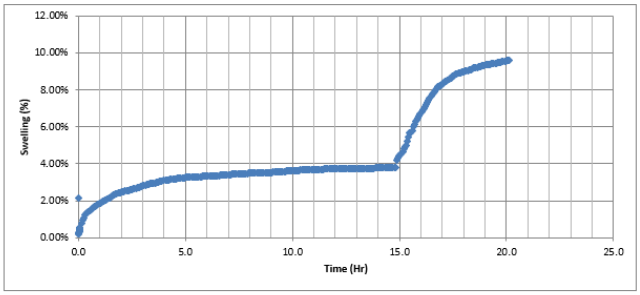
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.39 | g |
| Dry Unit Weight | 13.62 | kN/m$^3$ |
| Height of Sample | 10.500 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.91 | g's |
| Sample Height | - | 5.446 | mm |
| Testing Height | 10.469 | 10.814 | mm |
| Void Ratio, e | 0.945 | 1.009 | - |
| Moisture content, ω | 26.9% | 38.5% | - |
| Degree of Saturation | 76.9% | 91.8% | - |
| Change in ω | - | 11.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.21 | cm |
| Primary Swell | - | 3.3% | % |
| Ultimate Swell | - | 9.6% | % |
| Volume | 21.22 | 21.92 | cm$^3$ |
| Change in Volume | - | 0.70 | cm$^3$ |
| Mass of Water Lost | - | 3.37 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.82% | %/log cycle | Primary Swell | 3.29% | Stress (psf) | 166.3 |
| Slope of Secondary Swelling | 1.38% | %/log cycle | Time to Swell (hr) | 5.93 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | Shivangi |

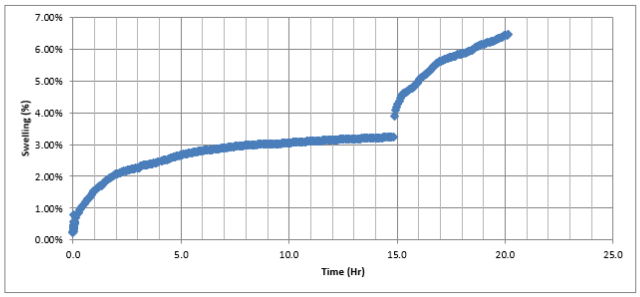
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.91 | g |
| Dry Unit Weight | 14.56 | kN/m$^3$ |
| Height of Sample | 10.561 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 20.14 | g's |
| Sample Height | - | 9.029 | mm |
| Testing Height | 10.523 | 10.829 | mm |
| Void Ratio, e | 0.819 | 0.872 | - |
| Moisture content, ω | 19.8% | 34.0% | - |
| Degree of Saturation | 65.2% | 98.1% | - |
| Change in ω | - | 14.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.32 | cm |
| Primary Swell | - | 2.9% | % |
| Ultimate Swell | - | 6.4% | % |
| Volume | 21.33 | 21.95 | cm$^3$ |
| Change in Volume | - | 0.62 | cm$^3$ |
| Mass of Water Lost | - | 3.67 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.61% | %/log cycle | Primary Swell | 2.91% | Stress (psf) | 258.5 |
| Slope of Secondary Swelling | 1.04% | %/log cycle | Time to Swell (hr) | 7.11 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | Shivangi |

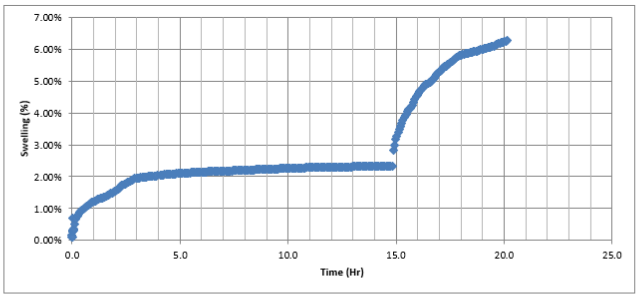
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.66 | g |
| Dry Unit Weight | 13.77 | kN/m$^3$ |
| Height of Sample | 10.505 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 20.33 | g's |
| Sample Height | - | 6.518 | mm |
| Testing Height | 10.464 | 10.687 | mm |
| Void Ratio, e | 0.923 | 0.964 | - |
| Moisture content, ω | 33.2% | 36.6% | - |
| Degree of Saturation | 97.1% | 94.7% | - |
| Change in ω | - | 3.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.66 | cm |
| Primary Swell | - | 2.1% | % |
| Ultimate Swell | - | 6.3% | % |
| Volume | 21.21 | 21.66 | cm$^3$ |
| Change in Volume | - | 0.45 | cm$^3$ |
| Mass of Water Lost | - | 3.65 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.15% | %/log cycle | Primary Swell | 2.13% | Stress (psf) 258.2 |
| Slope of Secondary Swelling | 0.53% | %/log cycle | Time to Swell (hr) | 5.80 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | Shivangi |

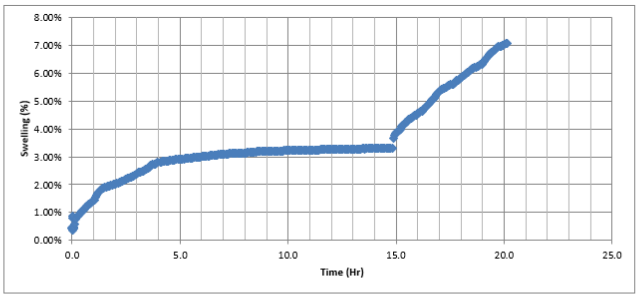
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.39 | g |
| Dry Unit Weight | 14.34 | kN/m$^3$ |
| Height of Sample | 10.358 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 20.32 | g's |
| Sample Height | - | 12.487 | mm |
| Testing Height | 10.323 | 10.647 | mm |
| Void Ratio, e | 0.847 | 0.905 | - |
| Moisture content, ω | 28.8% | 35.4% | - |
| Degree of Saturation | 91.8% | 97.9% | - |
| Change in ω | - | 6.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.21 | 3.65 | cm |
| Primary Swell | - | 3.1% | % |
| Ultimate Swell | - | 7.1% | % |
| Volume | 20.92 | 21.58 | cm$^3$ |
| Change in Volume | - | 0.66 | cm$^3$ |
| Mass of Water Lost | - | 2.68 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.92% | %/log cycle | Primary Swell | 3.14% | Stress (psf) 430.0 |
| Slope of Secondary Swelling | 0.54% | %/log cycle | Time to Swell (hr) | 7.13 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | Shivangi |

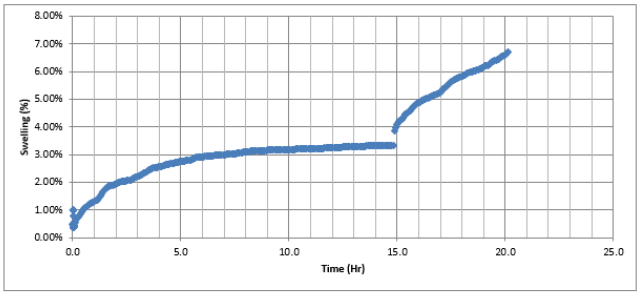
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.94 | g |
| Dry Unit Weight | 14.75 | kN/m$^3$ |
| Height of Sample | 10.612 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 20.16 | g's |
| Sample Height | - | 11.879 | mm |
| Testing Height | 10.562 | 10.889 | mm |
| Void Ratio, e | 0.796 | 0.851 | - |
| Moisture content, ω | 24.1% | 32.9% | - |
| Degree of Saturation | 81.7% | 96.9% | - |
| Change in ω | - | 8.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.42 | cm |
| Primary Swell | - | 3.1% | % |
| Ultimate Swell | - | 6.7% | % |
| Volume | 21.41 | 22.07 | cm$^3$ |
| Change in Volume | - | 0.66 | cm$^3$ |
| Mass of Water Lost | - | 2.58 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.91% | %/log cycle | Primary Swell | 3.10% | Stress (psf) | 429.4 |
| Slope of Secondary Swelling | 0.85% | %/log cycle | Time to Swell (hr) | 7.61 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

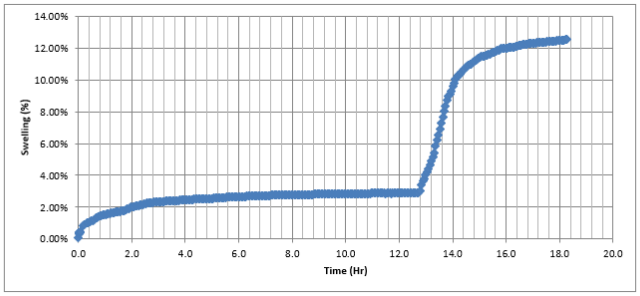
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.20 | g |
| Dry Unit Weight | 16.25 | kN/m$^3$ |
| Height of Sample | 10.627 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 38.13 | g's |
| Sample Height | - | 5.269 | mm |
| Testing Height | 10.592 | 10.883 | mm |
| Void Ratio, e | 0.630 | 0.675 | - |
| Moisture content, ω | 18.7% | 30.8% | - |
| Degree of Saturation | 80.0% | 99.7% | - |
| Change in ω | - | 12.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.69 | cm |
| Primary Swell | - | 2.7% | % |
| Ultimate Swell | - | 12.5% | % |
| Volume | 21.47 | 22.06 | cm$^3$ |
| Change in Volume | - | 0.59 | cm$^3$ |
| Mass of Water Lost | - | 2.84 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.44% | %/log cycle | Primary Swell | 2.75% | Stress (psf) | 352.8 |
| Slope of Secondary Swelling | 0.63% | %/log cycle | Time to Swell (hr) | 6.99 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

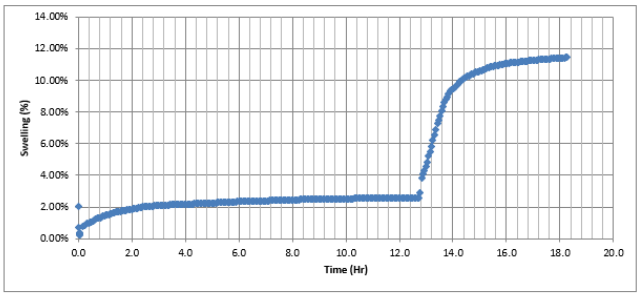
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.09 | g |
| Dry Unit Weight | 15.74 | kN/m$^3$ |
| Height of Sample | 10.653 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.86 | g's |
| Sample Height | - | 4.924 | mm |
| Testing Height | 10.611 | 10.861 | mm |
| Void Ratio, e | 0.683 | 0.723 | - |
| Moisture content, ω | 19.1% | 31.9% | - |
| Degree of Saturation | 75.5% | 98.2% | - |
| Change in ω | - | 12.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.43 | cm |
| Primary Swell | - | 2.4% | % |
| Ultimate Swell | - | 11.5% | % |
| Volume | 21.51 | 22.01 | cm$^3$ |
| Change in Volume | - | 0.51 | cm$^3$ |
| Mass of Water Lost | - | 3.09 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.12% | %/log cycle | Primary Swell | 2.35% | Stress (psf) | 341.4 |
| Slope of Secondary Swelling | 0.79% | %/log cycle | Time to Swell (hr) | 6.18 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

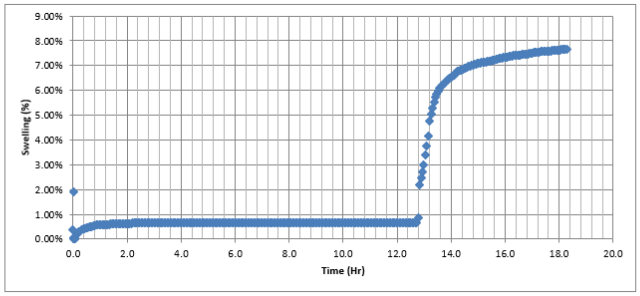
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.88 | g |
| Dry Unit Weight | 15.54 | kN/m$^3$ |
| Height of Sample | 10.668 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.67 | g's |
| Sample Height | - | 7.634 | mm |
| Testing Height | 10.627 | 10.698 | mm |
| Void Ratio, e | 0.704 | 0.715 | - |
| Moisture content, ω | 16.8% | 29.6% | - |
| Degree of Saturation | 64.6% | 95.7% | - |
| Change in ω | - | 12.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.21 | cm |
| Primary Swell | - | 0.7% | % |
| Ultimate Swell | - | 7.7% | % |
| Volume | 21.54 | 21.68 | cm$^3$ |
| Change in Volume | - | 0.14 | cm$^3$ |
| Mass of Water Lost | - | 3.93 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.22% | %/log cycle | Primary Swell | 0.66% | Stress (psf) | 505.9 |
| Slope of Secondary Swelling | 0.01% | %/log cycle | Time to Swell (hr) | 3.05 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

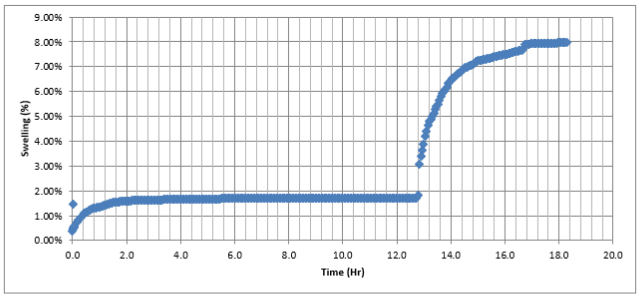
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.09 | g |
| Dry Unit Weight | 15.96 | kN/m$^3$ |
| Height of Sample | 10.602 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 38.14 | g's |
| Sample Height | - | 4.747 | mm |
| Testing Height | 10.582 | 10.759 | mm |
| Void Ratio, e | 0.660 | 0.687 | - |
| Moisture content, ω | 17.8% | 28.7% | - |
| Degree of Saturation | 72.7% | 98.0% | - |
| Change in ω | - | 11.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.56 | cm |
| Primary Swell | - | 1.7% | % |
| Ultimate Swell | - | 8.0% | % |
| Volume | 21.45 | 21.81 | cm$^3$ |
| Change in Volume | - | 0.36 | cm$^3$ |
| Mass of Water Lost | - | 3.75 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.52% | %/log cycle | Primary Swell | 1.67% | Stress (psf) | 511.8 |
| Slope of Secondary Swelling | 0.12% | %/log cycle | Time to Swell (hr) | 4.07 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

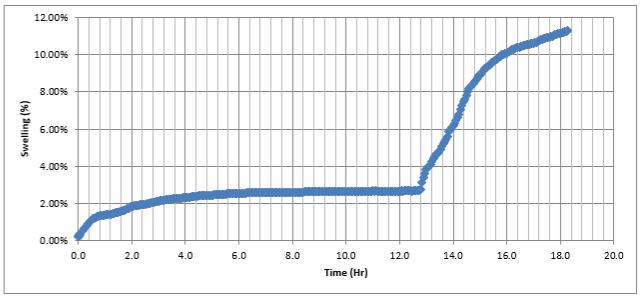
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.53 | g |
| Dry Unit Weight | 15.95 | kN/m$^3$ |
| Height of Sample | 10.612 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.44 | g's |
| Sample Height | - | 11.692 | mm |
| Testing Height | 10.586 | 10.857 | mm |
| Void Ratio, e | 0.661 | 0.703 | - |
| Moisture content, ω | 21.9% | 32.0% | - |
| Degree of Saturation | 89.6% | 100.0% | - |
| Change in ω | - | 10.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.22 | 3.31 | cm |
| Primary Swell | - | 2.6% | % |
| Ultimate Swell | - | 11.3% | % |
| Volume | 21.46 | 22.01 | cm$^3$ |
| Change in Volume | - | 0.55 | cm$^3$ |
| Mass of Water Lost | - | 6.29 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.50% | %/log cycle | Primary Swell | 2.56% | Stress (psf) | 829.8 |
| Slope of Secondary Swelling | 0.45% | %/log cycle | Time to Swell (hr) | 6.10 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/22/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

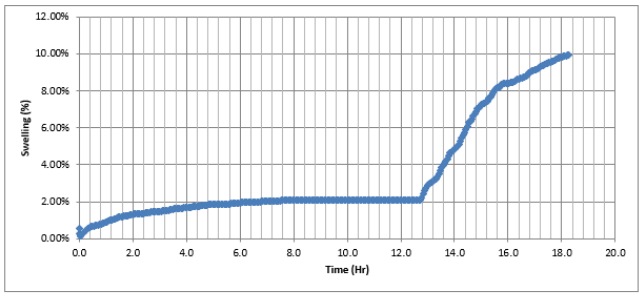
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B9 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.11 | g |
| Dry Unit Weight | 15.40 | kN/m$^3$ |
| Height of Sample | 10.470 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 38.12 | g's |
| Sample Height | - | 11.423 | mm |
| Testing Height | 10.438 | 10.653 | mm |
| Void Ratio, e | 0.720 | 0.756 | - |
| Moisture content, ω | 23.8% | 34.1% | - |
| Degree of Saturation | 89.2% | 100.0% | - |
| Change in ω | - | 10.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.58 | cm |
| Primary Swell | - | 2.1% | % |
| Ultimate Swell | - | 10.0% | % |
| Volume | 21.16 | 21.59 | cm$^3$ |
| Change in Volume | - | 0.44 | cm$^3$ |
| Mass of Water Lost | - | 3.36 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.34% | %/log cycle | Primary Swell | 2.07% | Stress (psf) | 849.1 |
| Slope of Secondary Swelling | 0.25% | %/log cycle | Time to Swell (hr) | 7.52 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/17/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | Shivangi |

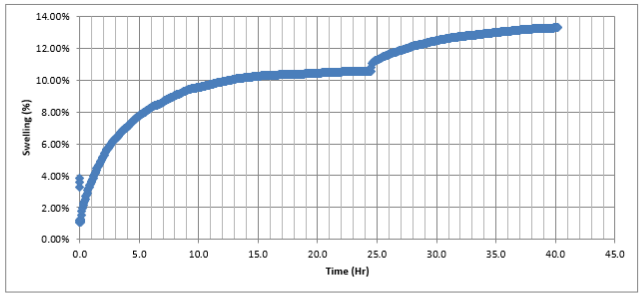
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B10 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 55.04 | g |
| Dry Unit Weight | 15.56 | kN/m$^3$ |
| Height of Sample | 15.431 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.35 | g's |
| Sample Height | - | 10.294 | mm |
| Testing Height | 15.412 | 16.955 | mm |
| Void Ratio, e | 0.702 | 0.872 | - |
| Moisture content, ω | 11.1% | 33.2% | - |
| Degree of Saturation | 42.5% | 96.6% | - |
| Change in ω | - | 22.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.06 | 2.68 | cm |
| Primary Swell | - | 10.0% | % |
| Ultimate Swell | - | 13.3% | % |
| Volume | 31.24 | 34.37 | cm$^3$ |
| Change in Volume | - | 3.13 | cm$^3$ |
| Mass of Water Lost | - | 8.49 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 5.55% | %/log cycle | Primary Swell | 10.02% | Stress (psf) | 171.2 |
| Slope of Secondary Swelling | 1.83% | %/log cycle | Time to Swell (hr) | 12.24 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/17/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | Shivangi |

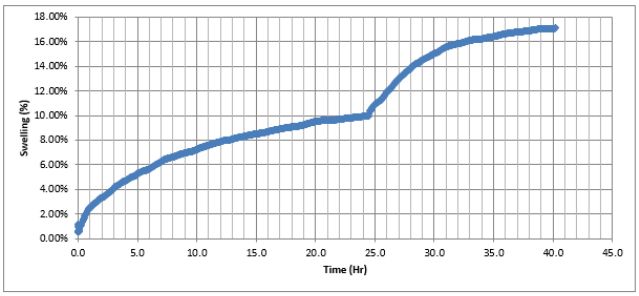
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B10 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 54.88 | g |
| Dry Unit Weight | 17.01 | kN/m$^3$ |
| Height of Sample | 13.467 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.47 | g's |
| Sample Height | - | 8.321 | mm |
| Testing Height | 13.431 | 14.379 | mm |
| Void Ratio, e | 0.557 | 0.667 | - |
| Moisture content, ω | 16.3% | 31.3% | - |
| Degree of Saturation | 78.8% | 100.0% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 3.00 | cm |
| Primary Swell | - | 7.1% | % |
| Ultimate Swell | - | 17.1% | % |
| Volume | 27.22 | 29.14 | cm$^3$ |
| Change in Volume | - | 1.92 | cm$^3$ |
| Mass of Water Lost | - | 6.55 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.47% | %/log cycle | Primary Swell | 7.06% | Stress (psf) | 179.0 |
| Slope of Secondary Swelling | 6.90% | %/log cycle | Time to Swell (hr) | 9.16 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/17/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | Shivangi |

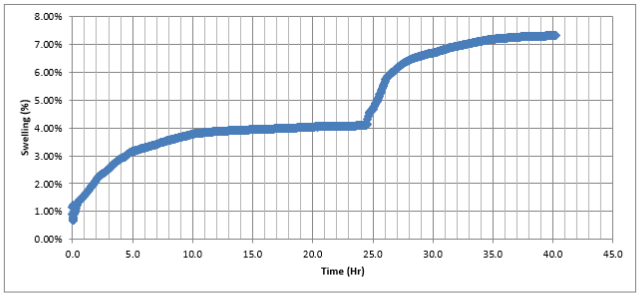
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B10 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.07 | g |
| Dry Unit Weight | 16.78 | kN/m$^3$ |
| Height of Sample | 11.582 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.58 | g's |
| Sample Height | - | 9.953 | mm |
| Testing Height | 11.530 | 11.974 | mm |
| Void Ratio, e | 0.579 | 0.639 | - |
| Moisture content, ω | 15.3% | 26.8% | - |
| Degree of Saturation | 71.2% | 100.0% | - |
| Change in ω | - | 11.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.15 | 3.33 | cm |
| Primary Swell | - | 3.9% | % |
| Ultimate Swell | - | 7.3% | % |
| Volume | 23.37 | 24.27 | cm$^3$ |
| Change in Volume | - | 0.90 | cm$^3$ |
| Mass of Water Lost | - | 3.99 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.01% | %/log cycle | Primary Swell | 3.85% | Stress (psf) | 258.6 |
| Slope of Secondary Swelling | 0.67% | %/log cycle | Time to Swell (hr) | 11.01 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/17/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | Shivangi |

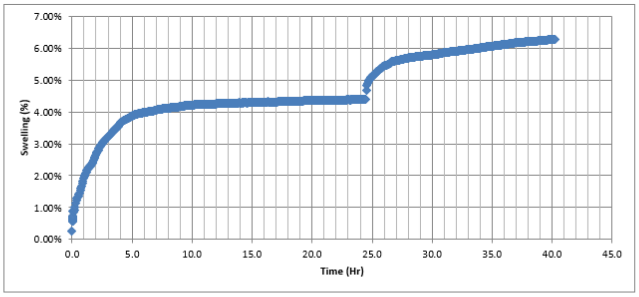
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B10 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.26 | g |
| Dry Unit Weight | 16.51 | kN/m$^3$ |
| Height of Sample | 11.460 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.66 | g's |
| Sample Height | - | 7.531 | mm |
| Testing Height | 11.407 | 11.889 | mm |
| Void Ratio, e | 0.604 | 0.672 | - |
| Moisture content, ω | 16.3% | 27.4% | - |
| Degree of Saturation | 72.8% | 100.0% | - |
| Change in ω | - | 11.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.57 | cm |
| Primary Swell | - | 4.2% | % |
| Ultimate Swell | - | 6.3% | % |
| Volume | 23.12 | 24.10 | cm$^3$ |
| Change in Volume | - | 0.98 | cm$^3$ |
| Mass of Water Lost | - | 5.05 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.31% | %/log cycle | Primary Swell | 4.22% | Stress (psf) | 262.1 |
| Slope of Secondary Swelling | 0.42% | %/log cycle | Time to Swell (hr) | 10.09 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/17/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | Shivangi |

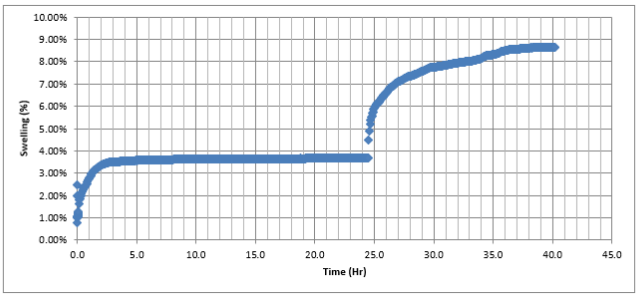
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B10 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.35 | g |
| Dry Unit Weight | 13.97 | kN/m$^3$ |
| Height of Sample | 11.328 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.50 | g's |
| Sample Height | - | 13.023 | mm |
| Testing Height | 11.273 | 11.678 | mm |
| Void Ratio, e | 0.896 | 0.964 | - |
| Moisture content, ω | 14.8% | 35.3% | - |
| Degree of Saturation | 44.5% | 90.0% | - |
| Change in ω | - | 20.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.12 | 3.21 | cm |
| Primary Swell | - | 3.6% | % |
| Ultimate Swell | - | 8.7% | % |
| Volume | 22.85 | 23.67 | cm$^3$ |
| Change in Volume | - | 0.82 | cm$^3$ |
| Mass of Water Lost | - | 2.71 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.03% | %/log cycle | Primary Swell | 3.59% | Stress (psf) | 416.0 |
| Slope of Secondary Swelling | 0.24% | %/log cycle | Time to Swell (hr) | 9.15 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/17/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | Shivangi |

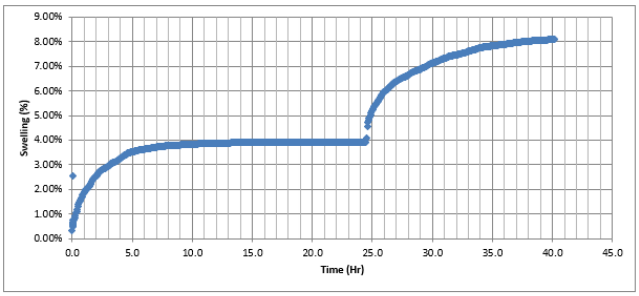
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B10 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.83 | g |
| Dry Unit Weight | 16.15 | kN/m$^3$ |
| Height of Sample | 12.035 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 16.66 | g's |
| Sample Height | - | 13.032 | mm |
| Testing Height | 11.984 | 12.449 | mm |
| Void Ratio, e | 0.640 | 0.704 | - |
| Moisture content, ω | 14.6% | 28.7% | - |
| Degree of Saturation | 61.6% | 100.0% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | 3.33 | cm |
| Primary Swell | - | 3.9% | % |
| Ultimate Swell | - | 8.1% | % |
| Volume | 24.29 | 25.23 | cm$^3$ |
| Change in Volume | - | 0.94 | cm$^3$ |
| Mass of Water Lost | - | 5.62 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.95% | %/log cycle |
| Slope of Secondary Swelling | 0.16% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.88% |
| Time to Swell (hr) | 10.42 |

| | |
|---|---|
| Stress (psf) | 428.4 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | Shivangi |

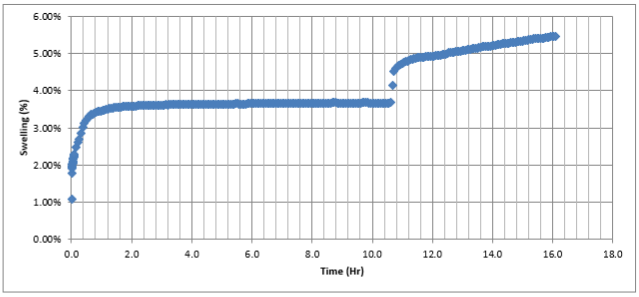
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.24 | g |
| Dry Unit Weight | 14.75 | kN/m$^3$ |
| Height of Sample | 10.429 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 18.46 | g's |
| Sample Height | - | 5.509 | mm |
| Testing Height | 10.418 | 10.794 | mm |
| Void Ratio, e | 0.796 | 0.861 | - |
| Moisture content, ω | 17.3% | 31.5% | - |
| Degree of Saturation | 58.8% | 95.2% | - |
| Change in ω | - | 14.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.51 | cm |
| Primary Swell | - | 3.6% | % |
| Ultimate Swell | - | 5.5% | % |
| Volume | 21.11 | 21.88 | cm$^3$ |
| Change in Volume | - | 0.76 | cm$^3$ |
| Mass of Water Lost | - | 3.33 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.92% | %/log cycle |
| Slope of Secondary Swelling | 0.10% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.61% |
| Time to Swell (hr) | 2.53 |

| | |
|---|---|
| Stress (psf) | 167.5 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | Shivangi |

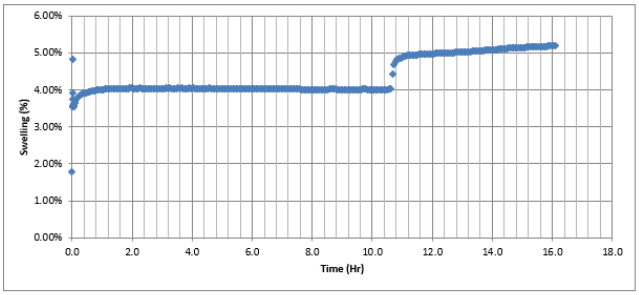
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.04 | g |
| Dry Unit Weight | 14.75 | kN/m$^3$ |
| Height of Sample | 10.765 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 18.45 | g's |
| Sample Height | - | 5.754 | mm |
| Testing Height | 10.738 | 11.174 | mm |
| Void Ratio, e | 0.795 | 0.868 | - |
| Moisture content, ω | 16.2% | 32.4% | - |
| Degree of Saturation | 55.1% | 98.3% | - |
| Change in ω | - | 16.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.50 | cm |
| Primary Swell | - | 4.1% | % |
| Ultimate Swell | - | 5.2% | % |
| Volume | 21.76 | 22.65 | cm$^3$ |
| Change in Volume | - | 0.88 | cm$^3$ |
| Mass of Water Lost | - | 2.42 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.29% | %/log cycle | Primary Swell | 4.06% | Stress (psf) | 169.6 |
| Slope of Secondary Swelling | -0.06% | %/log cycle | Time to Swell (hr) | 1.45 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | Shivangi |

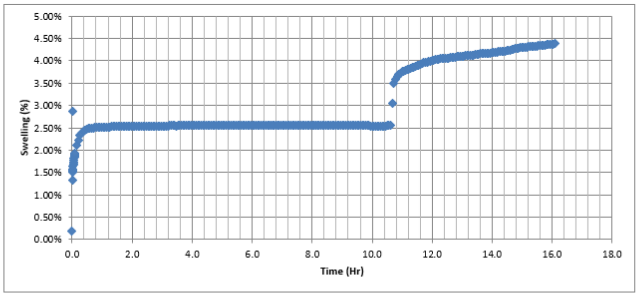
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.16 | g |
| Dry Unit Weight | 15.19 | kN/m$^3$ |
| Height of Sample | 10.780 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 18.65 | g's |
| Sample Height | - | 9.221 | mm |
| Testing Height | 10.762 | 11.034 | mm |
| Void Ratio, e | 0.744 | 0.788 | - |
| Moisture content, ω | 16.0% | 29.7% | - |
| Degree of Saturation | 57.9% | 97.8% | - |
| Change in ω | - | 13.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.54 | cm |
| Primary Swell | - | 2.5% | % |
| Ultimate Swell | - | 4.4% | % |
| Volume | 21.81 | 22.36 | cm$^3$ |
| Change in Volume | - | 0.55 | cm$^3$ |
| Mass of Water Lost | - | 2.34 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.43% | %/log cycle | Primary Swell | 2.53% | Stress (psf) | 254.4 |
| Slope of Secondary Swelling | 0.03% | %/log cycle | Time to Swell (hr) | 1.34 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | Shivangi |

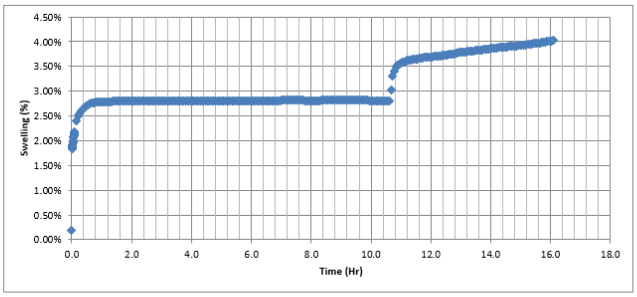
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.17 | g |
| Dry Unit Weight | 14.16 | kN/m$^3$ |
| Height of Sample | 10.582 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 18.47 | g's |
| Sample Height | - | 6.547 | mm |
| Testing Height | 10.540 | 10.835 | mm |
| Void Ratio, e | 0.870 | 0.923 | - |
| Moisture content, ω | 17.3% | 33.2% | - |
| Degree of Saturation | 53.6% | 94.7% | - |
| Change in ω | - | 15.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.35 | cm |
| Primary Swell | - | 2.8% | % |
| Ultimate Swell | - | 4.0% | % |
| Volume | 21.36 | 21.96 | cm$^3$ |
| Change in Volume | - | 0.60 | cm$^3$ |
| Mass of Water Lost | - | 2.06 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.36% | %/log cycle | Primary Swell | 2.80% | Stress (psf) | 249.6 |
| Slope of Secondary Swelling | 0.03% | %/log cycle | Time to Swell (hr) | 2.03 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | Shivangi |

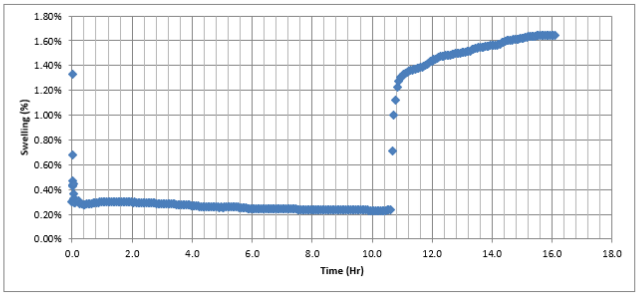
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.80 | g |
| Dry Unit Weight | 13.85 | kN/m$^3$ |
| Height of Sample | 10.582 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 18.46 | g's |
| Sample Height | - | 11.930 | mm |
| Testing Height | 10.561 | 10.592 | mm |
| Void Ratio, e | 0.913 | 0.919 | - |
| Moisture content, ω | 18.5% | 31.6% | - |
| Degree of Saturation | 54.7% | 90.4% | - |
| Change in ω | - | 13.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.12 | cm |
| Primary Swell | - | 0.3% | % |
| Ultimate Swell | - | 1.6% | % |
| Volume | 21.41 | 21.47 | cm$^3$ |
| Change in Volume | - | 0.06 | cm$^3$ |
| Mass of Water Lost | - | 3.04 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.01% | %/log cycle | Primary Swell | 0.30% | Stress (psf) | 416.8 |
| Slope of Secondary Swelling | -0.11% | %/log cycle | Time to Swell (hr) | 2.56 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | Shivangi |

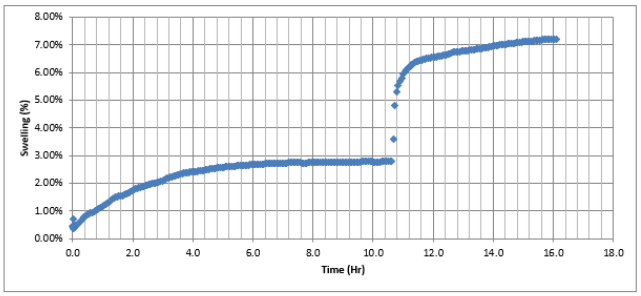
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.39 | g |
| Dry Unit Weight | 15.45 | $kN/m^3$ |
| Height of Sample | 10.897 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 18.66 | g's |
| Sample Height | - | 11.585 | mm |
| Testing Height | 10.878 | 11.172 | mm |
| Void Ratio, e | 0.714 | 0.760 | - |
| Moisture content, ω | 19.2% | 30.4% | - |
| Degree of Saturation | 72.5% | 98.0% | - |
| Change in ω | - | 11.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.35 | cm |
| Primary Swell | - | 2.7% | % |
| Ultimate Swell | - | 7.2% | % |
| Volume | 22.05 | 22.64 | $cm^3$ |
| Change in Volume | - | 0.60 | $cm^3$ |
| Mass of Water Lost | - | 2.38 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.68% | %/log cycle |
| Slope of Secondary Swelling | 0.32% | %/log cycle |

| | |
|---|---|
| Primary Swell | 2.70% |
| Time to Swell (hr) | 5.87 |

| | |
|---|---|
| Stress (psf) | 434.7 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Shivangi |

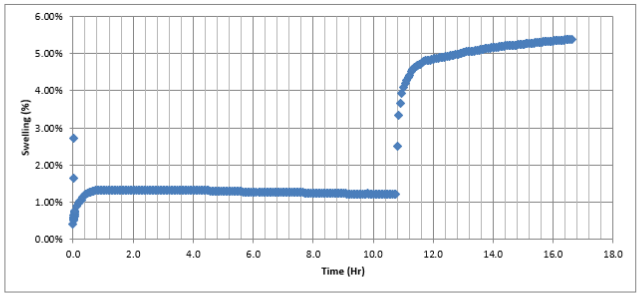
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.88 | g |
| Dry Unit Weight | 15.62 | $kN/m^3$ |
| Height of Sample | 10.739 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.12 | g's |
| Sample Height | - | 3.399 | mm |
| Testing Height | 10.712 | 10.857 | mm |
| Void Ratio, e | 0.696 | 0.719 | - |
| Moisture content, ω | 12.5% | 28.0% | - |
| Degree of Saturation | 48.4% | 96.2% | - |
| Change in ω | - | 15.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.28 | cm |
| Primary Swell | - | 1.4% | % |
| Ultimate Swell | - | 5.4% | % |
| Volume | 21.71 | 22.01 | $cm^3$ |
| Change in Volume | - | 0.29 | $cm^3$ |
| Mass of Water Lost | - | 3.42 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.35% | %/log cycle |
| Slope of Secondary Swelling | -0.19% | %/log cycle |

| | |
|---|---|
| Primary Swell | 1.35% |
| Time to Swell (hr) | 1.96 |

| | |
|---|---|
| Stress (psf) | 350.7 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Shivangi |

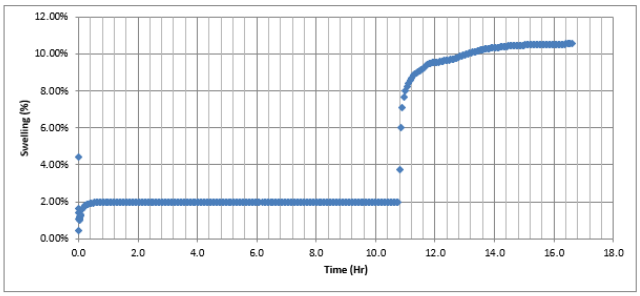
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.98 | g |
| Dry Unit Weight | 15.25 | $kN/m^3$ |
| Height of Sample | 11.125 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 36.76 | g's |
| Sample Height | - | 3.430 | mm |
| Testing Height | 11.087 | 11.307 | mm |
| Void Ratio, e | 0.737 | 0.771 | - |
| Moisture content, ω | 11.6% | 33.0% | - |
| Degree of Saturation | 42.4% | 96.8% | - |
| Change in ω | - | 21.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 2.95 | cm |
| Primary Swell | - | 2.0% | % |
| Ultimate Swell | - | 10.6% | % |
| Volume | 22.47 | 22.92 | $cm^3$ |
| Change in Volume | - | 0.45 | $cm^3$ |
| Mass of Water Lost | - | 2.71 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.20% | %/log cycle |
| Slope of Secondary Swelling | -0.01% | %/log cycle |

| | |
|---|---|
| Primary Swell | 1.98% |
| Time to Swell (hr) | 1.47 |

| | |
|---|---|
| Stress (psf) | 352.3 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Shivangi |

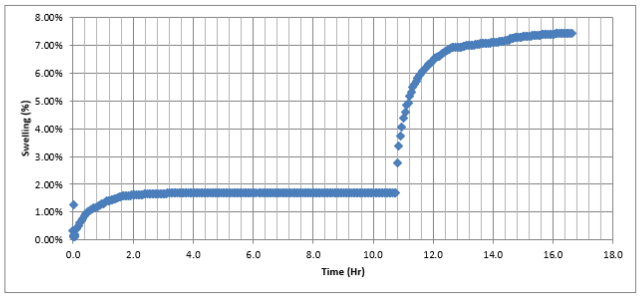
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.73 | g |
| Dry Unit Weight | 16.99 | $kN/m^3$ |
| Height of Sample | 10.932 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.17 | g's |
| Sample Height | - | 8.606 | mm |
| Testing Height | 10.911 | 11.092 | mm |
| Void Ratio, e | 0.559 | 0.585 | - |
| Moisture content, ω | 11.6% | 24.4% | - |
| Degree of Saturation | 56.0% | 97.8% | - |
| Change in ω | - | 12.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.34 | cm |
| Primary Swell | - | 1.7% | % |
| Ultimate Swell | - | 7.4% | % |
| Volume | 22.11 | 22.48 | $cm^3$ |
| Change in Volume | - | 0.37 | $cm^3$ |
| Mass of Water Lost | - | 2.69 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 1.11% | %/log cycle |
| Slope of Secondary Swelling | 0.05% | %/log cycle |

| | |
|---|---|
| Primary Swell | 1.66% |
| Time to Swell (hr) | 2.00 |

| | |
|---|---|
| Stress (psf) | 894.3 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Shivangi |

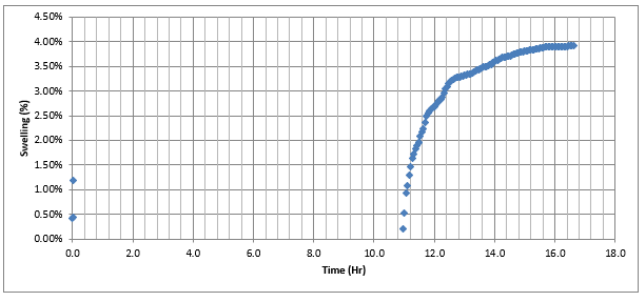
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.93 | g |
| Dry Unit Weight | 18.31 | kN/m$^3$ |
| Height of Sample | 10.876 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.50 | g's |
| Sample Height | - | 10.659 | mm |
| Testing Height | 10.831 | 10.505 | mm |
| Void Ratio, e | 0.446 | 0.403 | - |
| Moisture content, ω | 12.1% | 30.1% | - |
| Degree of Saturation | 73.1% | 100.0% | - |
| Change in ω | - | 18.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.36 | cm |
| Primary Swell | - | -3.0% | % |
| Ultimate Swell | - | 3.9% | % |
| Volume | 21.95 | 21.29 | cm$^3$ |
| Change in Volume | - | -0.66 | cm$^3$ |
| Mass of Water Lost | - | 3.37 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.33% | %/log cycle | Primary Swell | -3.01% | Stress (psf) | 932.6 |
| Slope of Secondary Swelling | -0.09% | %/log cycle | Time to Swell (hr) | 1.36 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

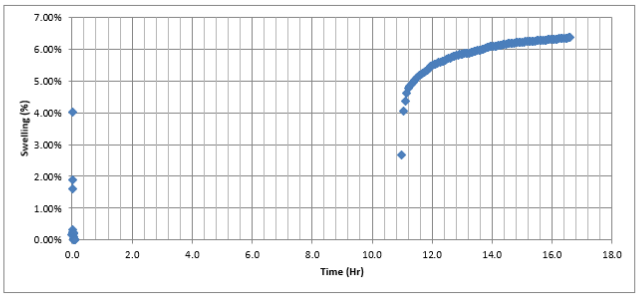
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.71 | g |
| Dry Unit Weight | 15.64 | kN/m$^3$ |
| Height of Sample | 10.820 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 53.84 | g's |
| Sample Height | - | 7.709 | mm |
| Testing Height | 10.780 | 10.777 | mm |
| Void Ratio, e | 0.694 | 0.693 | - |
| Moisture content, ω | 14.0% | 28.8% | - |
| Degree of Saturation | 54.5% | 97.1% | - |
| Change in ω | - | 14.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.53 | cm |
| Primary Swell | - | 0.0% | % |
| Ultimate Swell | - | 6.4% | % |
| Volume | 21.85 | 21.84 | cm$^3$ |
| Change in Volume | - | -0.01 | cm$^3$ |
| Mass of Water Lost | - | 3.32 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.09% | %/log cycle | Primary Swell | -0.03% | Stress (psf) | 519.5 |
| Slope of Secondary Swelling | -0.04% | %/log cycle | Time to Swell (hr) | 0.45 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

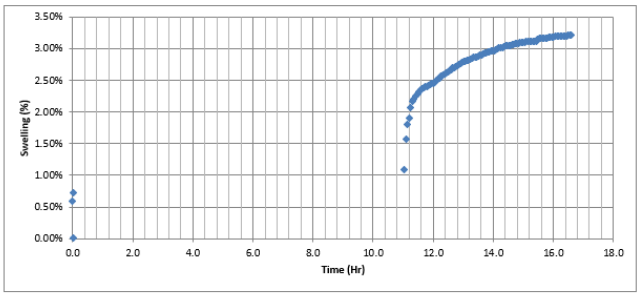
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.87 | g |
| Dry Unit Weight | 14.56 | kN/m$^3$ |
| Height of Sample | 10.465 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 53.38 | g's |
| Sample Height | - | 7.160 | mm |
| Testing Height | 10.406 | 10.129 | mm |
| Void Ratio, e | 0.819 | 0.770 | - |
| Moisture content, ω | 14.6% | 31.0% | - |
| Degree of Saturation | 48.0% | 95.3% | - |
| Change in ω | - | 16.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.23 | cm |
| Primary Swell | - | -2.7% | % |
| Ultimate Swell | - | 3.2% | % |
| Volume | 21.09 | 20.53 | cm$^3$ |
| Change in Volume | - | -0.56 | cm$^3$ |
| Mass of Water Lost | - | 3.11 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.16% | %/log cycle | Primary Swell | -2.66% | Stress (psf) | 520.9 |
| Slope of Secondary Swelling | -0.03% | %/log cycle | Time to Swell (hr) | 0.59 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

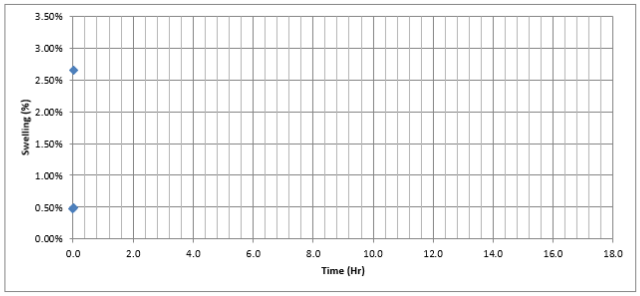
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.40 | g |
| Dry Unit Weight | 14.49 | kN/m$^3$ |
| Height of Sample | 10.607 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 53.38 | g's |
| Sample Height | - | 11.734 | mm |
| Testing Height | 10.505 | 10.049 | mm |
| Void Ratio, e | 0.828 | 0.749 | - |
| Moisture content, ω | 12.6% | 27.0% | - |
| Degree of Saturation | 41.0% | 91.0% | - |
| Change in ω | - | 14.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 2.83 | cm |
| Primary Swell | - | -4.3% | % |
| Ultimate Swell | - | -1.5% | % |
| Volume | 21.29 | 20.37 | cm$^3$ |
| Change in Volume | - | -0.92 | cm$^3$ |
| Mass of Water Lost | - | 7.54 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.27% | %/log cycle | Primary Swell | -4.34% | Stress (psf) | 1283.5 |
| Slope of Secondary Swelling | -0.10% | %/log cycle | Time to Swell (hr) | 0.60 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/23/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

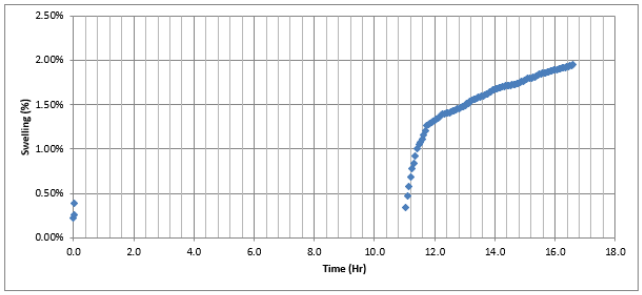
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B11 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.37 | g |
| Dry Unit Weight | 15.10 | kN/m$^3$ |
| Height of Sample | 10.607 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 54.47 | g's |
| Sample Height | - | 11.720 | mm |
| Testing Height | 10.554 | 10.284 | mm |
| Void Ratio, e | 0.754 | 0.709 | - |
| Moisture content, ω | 13.5% | 26.8% | - |
| Degree of Saturation | 48.3% | 91.8% | - |
| Change in ω | - | 13.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.50 | cm |
| Primary Swell | - | -2.6% | % |
| Ultimate Swell | - | 2.0% | % |
| Volume | 21.39 | 20.84 | cm$^3$ |
| Change in Volume | - | -0.55 | cm$^3$ |
| Mass of Water Lost | - | 4.26 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.12% | %/log cycle | Primary Swell | -2.55% | Stress (psf) | 1306.3 |
| Slope of Secondary Swelling | -0.08% | %/log cycle | Time to Swell (hr) | 0.65 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | Shivangi |

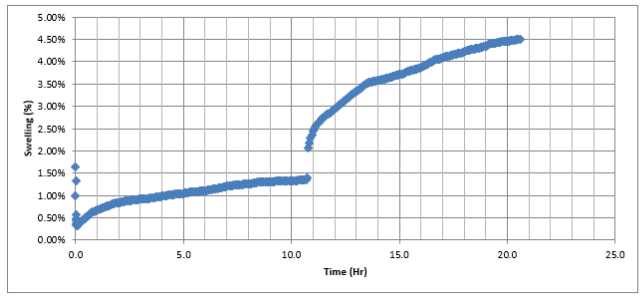
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.59 | g |
| Dry Unit Weight | 13.79 | kN/m$^3$ |
| Height of Sample | 11.521 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 14.21 | g's |
| Sample Height | - | 6.656 | mm |
| Testing Height | 11.486 | 11.613 | mm |
| Void Ratio, e | 0.921 | 0.942 | - |
| Moisture content, ω | 11.8% | 32.8% | - |
| Degree of Saturation | 34.7% | 88.0% | - |
| Change in ω | - | 21.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.15 | cm |
| Primary Swell | - | 1.1% | % |
| Ultimate Swell | - | 4.5% | % |
| Volume | 23.28 | 23.54 | cm$^3$ |
| Change in Volume | - | 0.26 | cm$^3$ |
| Mass of Water Lost | - | 2.26 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.56% | %/log cycle | Primary Swell | 1.10% | Stress (psf) | 160.9 |
| Slope of Secondary Swelling | 0.92% | %/log cycle | Time to Swell (hr) | 5.68 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | Shivangi |

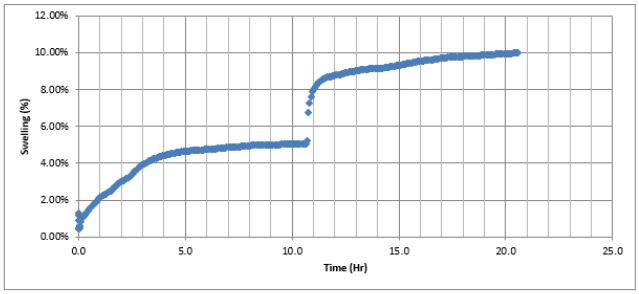
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.29 | g |
| Dry Unit Weight | 15.34 | kN/m$^3$ |
| Height of Sample | 10.551 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 14.37 | g's |
| Sample Height | - | 5.486 | mm |
| Testing Height | 10.502 | 11.001 | mm |
| Void Ratio, e | 0.727 | 0.809 | - |
| Moisture content, ω | 24.1% | 34.0% | - |
| Degree of Saturation | 89.4% | 100.0% | - |
| Change in ω | - | 9.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.52 | cm |
| Primary Swell | - | 4.8% | % |
| Ultimate Swell | - | 10.0% | % |
| Volume | 21.29 | 22.30 | cm$^3$ |
| Change in Volume | - | 1.01 | cm$^3$ |
| Mass of Water Lost | - | 4.79 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.13% | %/log cycle | Primary Swell | 4.75% | Stress (psf) | 166.7 |
| Slope of Secondary Swelling | 1.23% | %/log cycle | Time to Swell (hr) | 6.01 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | Shivangi |

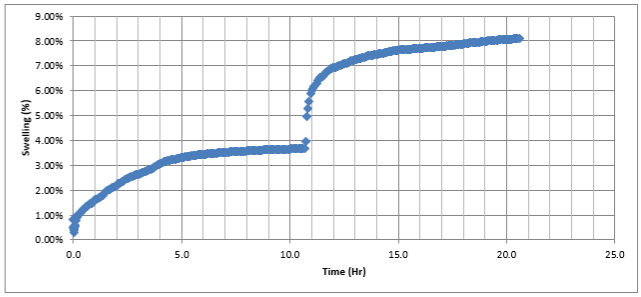
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.45 | g |
| Dry Unit Weight | 15.41 | kN/m$^3$ |
| Height of Sample | 10.724 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 14.29 | g's |
| Sample Height | - | 8.989 | mm |
| Testing Height | 10.679 | 11.049 | mm |
| Void Ratio, e | 0.719 | 0.779 | - |
| Moisture content, ω | 21.9% | 32.6% | - |
| Degree of Saturation | 82.4% | 100.0% | - |
| Change in ω | - | 10.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.21 | cm |
| Primary Swell | - | 3.5% | % |
| Ultimate Swell | - | 8.1% | % |
| Volume | 21.64 | 22.39 | cm$^3$ |
| Change in Volume | - | 0.75 | cm$^3$ |
| Mass of Water Lost | - | 2.41 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.12% | %/log cycle | Primary Swell | 3.46% | Stress (psf) | 252.8 |
| Slope of Secondary Swelling | 0.93% | %/log cycle | Time to Swell (hr) | 6.14 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | Shivangi |

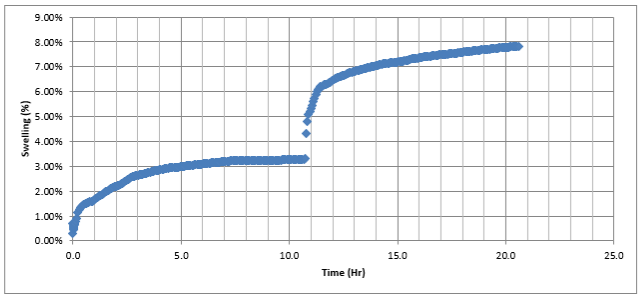
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.92 | g |
| Dry Unit Weight | 15.45 | kN/m$^3$ |
| Height of Sample | 10.577 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 14.54 | g's |
| Sample Height | - | 6.571 | mm |
| Testing Height | 10.544 | 10.876 | mm |
| Void Ratio, e | 0.715 | 0.769 | - |
| Moisture content, ω | 21.6% | 32.6% | - |
| Degree of Saturation | 81.6% | 100.0% | - |
| Change in ω | - | 11.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.60 | cm |
| Primary Swell | - | 3.1% | % |
| Ultimate Swell | - | 7.8% | % |
| Volume | 21.37 | 22.04 | cm$^3$ |
| Change in Volume | - | 0.67 | cm$^3$ |
| Mass of Water Lost | - | 2.14 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.61% | %/log cycle | Primary Swell | 3.15% | Stress (psf) | 258.9 |
| Slope of Secondary Swelling | 0.60% | %/log cycle | Time to Swell (hr) | 6.46 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | Shivangi |

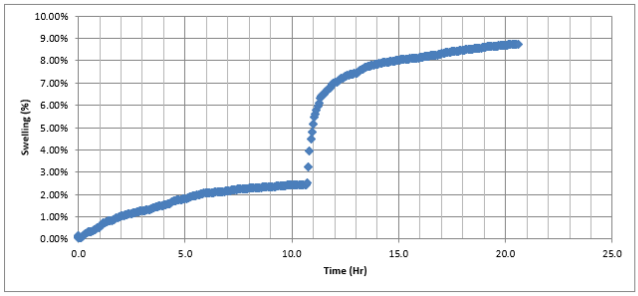
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.54 | g |
| Dry Unit Weight | 15.75 | kN/m$^3$ |
| Height of Sample | 10.617 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 14.31 | g's |
| Sample Height | - | 12.110 | mm |
| Testing Height | 10.581 | 10.784 | mm |
| Void Ratio, e | 0.681 | 0.714 | - |
| Moisture content, ω | 20.6% | 30.2% | - |
| Degree of Saturation | 81.7% | 98.5% | - |
| Change in ω | - | 9.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.10 | cm |
| Primary Swell | - | 1.9% | % |
| Ultimate Swell | - | 8.8% | % |
| Volume | 21.45 | 21.86 | cm$^3$ |
| Change in Volume | - | 0.41 | cm$^3$ |
| Mass of Water Lost | - | 2.78 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.74% | %/log cycle | Primary Swell | 1.92% | Stress (psf) | 425.3 |
| Slope of Secondary Swelling | 1.62% | %/log cycle | Time to Swell (hr) | 4.94 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | Shivangi |

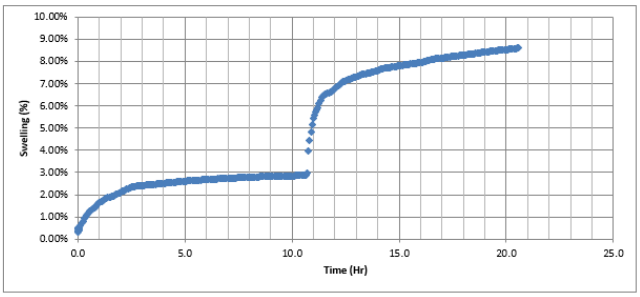
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.85 | g |
| Dry Unit Weight | 15.94 | kN/m$^3$ |
| Height of Sample | 10.704 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 14.54 | g's |
| Sample Height | - | 11.389 | mm |
| Testing Height | 10.667 | 10.955 | mm |
| Void Ratio, e | 0.662 | 0.707 | - |
| Moisture content, ω | 19.1% | 29.7% | - |
| Degree of Saturation | 78.1% | 99.7% | - |
| Change in ω | - | 10.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.54 | cm |
| Primary Swell | - | 2.7% | % |
| Ultimate Swell | - | 8.6% | % |
| Volume | 21.62 | 22.20 | cm$^3$ |
| Change in Volume | - | 0.58 | cm$^3$ |
| Mass of Water Lost | - | 3.58 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.42% | %/log cycle | Primary Swell | 2.70% | Stress (psf) | 423.5 |
| Slope of Secondary Swelling | 0.70% | %/log cycle | Time to Swell (hr) | 6.08 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Shivangi |

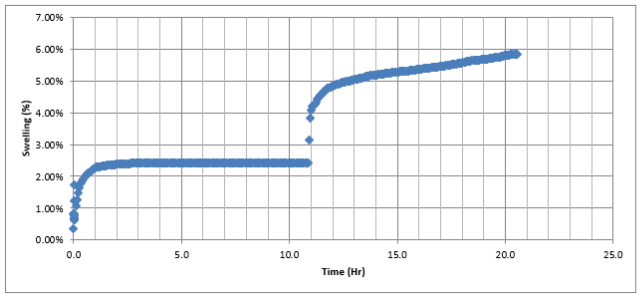
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.21 | g |
| Dry Unit Weight | 14.07 | kN/m$^3$ |
| Height of Sample | 10.358 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.12 | g's |
| Sample Height | - | 2.955 | mm |
| Testing Height | 10.324 | 10.574 | mm |
| Void Ratio, e | 0.882 | 0.928 | - |
| Moisture content, ω | 20.6% | 35.2% | - |
| Degree of Saturation | 63.1% | 95.8% | - |
| Change in ω | - | 14.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.26 | cm |
| Primary Swell | - | 2.4% | % |
| Ultimate Swell | - | 5.8% | % |
| Volume | 20.92 | 21.43 | cm$^3$ |
| Change in Volume | - | 0.51 | cm$^3$ |
| Mass of Water Lost | - | 3.21 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.59% | %/log cycle | Primary Swell | 2.42% | Stress (psf) | 331.6 |
| Slope of Secondary Swelling | 0.02% | %/log cycle | Time to Swell (hr) | 3.42 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Shivangi |

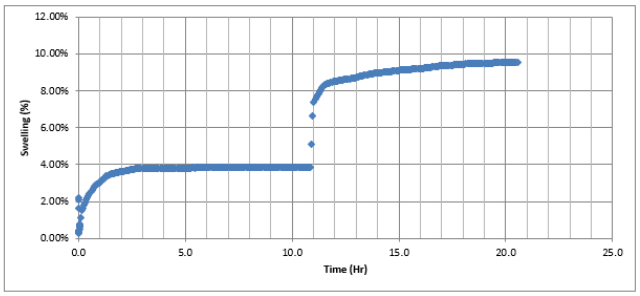
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.02 | g |
| Dry Unit Weight | 15.11 | $kN/m^3$ |
| Height of Sample | 10.632 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.36 | g's |
| Sample Height | - | 3.177 | mm |
| Testing Height | 10.610 | 11.015 | mm |
| Void Ratio, e | 0.753 | 0.819 | - |
| Moisture content, ω | 20.8% | 34.9% | - |
| Degree of Saturation | 74.6% | 100.0% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.53 | cm |
| Primary Swell | - | 3.8% | % |
| Ultimate Swell | - | 9.6% | % |
| Volume | 21.51 | 22.33 | $cm^3$ |
| Change in Volume | - | 0.82 | $cm^3$ |
| Mass of Water Lost | - | 2.13 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.72% | %/log cycle | Primary Swell | 3.81% | Stress (psf) | 344.9 |
| Slope of Secondary Swelling | 0.06% | %/log cycle | Time to Swell (hr) | 3.38 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | Shivangi |

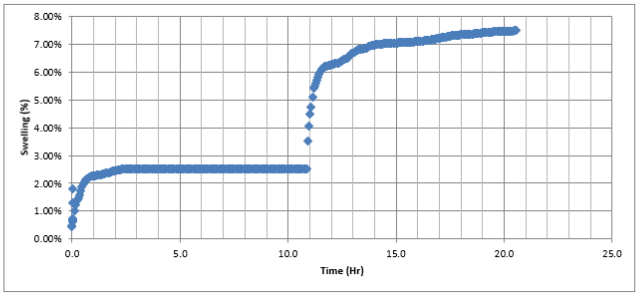
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.59 | g |
| Dry Unit Weight | 14.80 | $kN/m^3$ |
| Height of Sample | 10.551 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.70 | g's |
| Sample Height | - | 4.449 | mm |
| Testing Height | 10.516 | 10.780 | mm |
| Void Ratio, e | 0.789 | 0.834 | - |
| Moisture content, ω | 20.0% | 33.7% | - |
| Degree of Saturation | 68.4% | 98.5% | - |
| Change in ω | - | 13.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.48 | cm |
| Primary Swell | - | 2.5% | % |
| Ultimate Swell | - | 7.5% | % |
| Volume | 21.31 | 21.85 | $cm^3$ |
| Change in Volume | - | 0.54 | $cm^3$ |
| Mass of Water Lost | - | 2.94 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.75% | %/log cycle | Primary Swell | 2.51% | Stress (psf) | 532.8 |
| Slope of Secondary Swelling | 0.01% | %/log cycle | Time to Swell (hr) | 3.33 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | Shivangi |

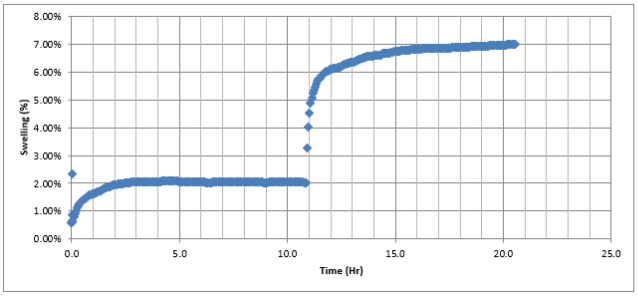
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.16 | g |
| Dry Unit Weight | 14.52 | kN/m$^3$ |
| Height of Sample | 10.587 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.51 | g's |
| Sample Height | - | 4.009 | mm |
| Testing Height | 10.535 | 10.753 | mm |
| Void Ratio, e | 0.824 | 0.862 | - |
| Moisture content, ω | 20.7% | 34.7% | - |
| Degree of Saturation | 67.9% | 98.4% | - |
| Change in ω | - | 14.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.34 | cm |
| Primary Swell | - | 2.1% | % |
| Ultimate Swell | - | 7.0% | % |
| Volume | 21.35 | 21.79 | cm$^3$ |
| Change in Volume | - | 0.44 | cm$^3$ |
| Mass of Water Lost | - | 4.32 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.83% | %/log cycle | Primary Swell | 2.07% | Stress (psf) | 523.9 |
| Slope of Secondary Swelling | -0.05% | %/log cycle | Time to Swell (hr) | 3.48 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Shivangi |

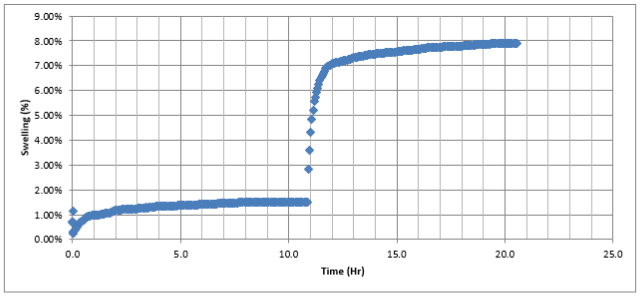
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.07 | g |
| Dry Unit Weight | 15.53 | kN/m$^3$ |
| Height of Sample | 10.135 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.49 | g's |
| Sample Height | - | 8.277 | mm |
| Testing Height | 10.099 | 10.233 | mm |
| Void Ratio, e | 0.706 | 0.728 | - |
| Moisture content, ω | 20.6% | 32.3% | - |
| Degree of Saturation | 78.8% | 100.0% | - |
| Change in ω | - | 11.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.12 | cm |
| Primary Swell | - | 1.3% | % |
| Ultimate Swell | - | 7.9% | % |
| Volume | 20.47 | 20.74 | cm$^3$ |
| Change in Volume | - | 0.27 | cm$^3$ |
| Mass of Water Lost | - | 4.59 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.64% | %/log cycle | Primary Swell | 1.33% | Stress (psf) | 864.1 |
| Slope of Secondary Swelling | 0.47% | %/log cycle | Time to Swell (hr) | 4.04 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Shivangi |

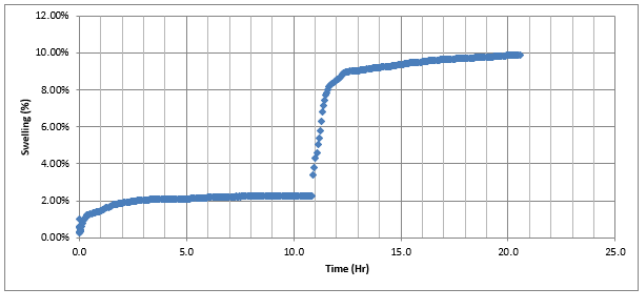
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.78 | g |
| Dry Unit Weight | 15.30 | kN/m$^3$ |
| Height of Sample | 10.500 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.69 | g's |
| Sample Height | - | 7.909 | mm |
| Testing Height | 10.469 | 10.677 | mm |
| Void Ratio, e | 0.731 | 0.765 | - |
| Moisture content, ω | 20.2% | 32.3% | - |
| Degree of Saturation | 74.6% | 96.8% | - |
| Change in ω | - | 12.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.25 | cm |
| Primary Swell | - | 2.0% | % |
| Ultimate Swell | - | 9.9% | % |
| Volume | 21.22 | 21.64 | cm$^3$ |
| Change in Volume | - | 0.42 | cm$^3$ |
| Mass of Water Lost | - | 2.74 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.97% | %/log cycle | Primary Swell | 1.99% | Stress (psf) | 877.5 |
| Slope of Secondary Swelling | 0.48% | %/log cycle | Time to Swell (hr) | 2.62 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

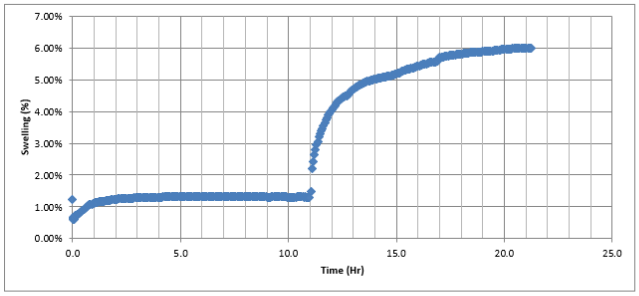
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.33 | g |
| Dry Unit Weight | 15.92 | kN/m$^3$ |
| Height of Sample | 10.602 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 47.69 | g's |
| Sample Height | - | 5.289 | mm |
| Testing Height | 10.574 | 10.712 | mm |
| Void Ratio, e | 0.664 | 0.686 | - |
| Moisture content, ω | 18.9% | 28.7% | - |
| Degree of Saturation | 76.7% | 100.0% | - |
| Change in ω | - | 9.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.18 | cm |
| Primary Swell | - | 1.3% | % |
| Ultimate Swell | - | 6.0% | % |
| Volume | 21.43 | 21.71 | cm$^3$ |
| Change in Volume | - | 0.28 | cm$^3$ |
| Mass of Water Lost | - | 3.74 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.42% | %/log cycle | Primary Swell | 1.30% | Stress (psf) | 555.3 |
| Slope of Secondary Swelling | 0.02% | %/log cycle | Time to Swell (hr) | 3.19 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

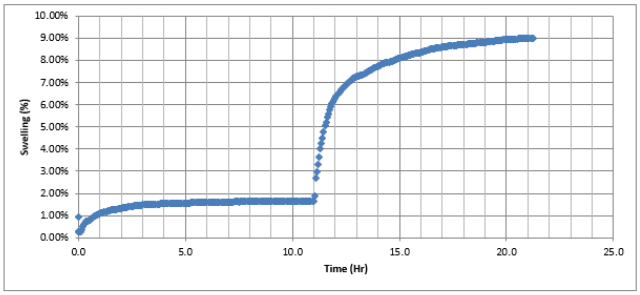
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.28 | g |
| Dry Unit Weight | 16.16 | $kN/m^3$ |
| Height of Sample | 10.643 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 48.09 | g's |
| Sample Height | - | 4.932 | mm |
| Testing Height | 10.612 | 10.773 | mm |
| Void Ratio, e | 0.640 | 0.665 | - |
| Moisture content, ω | 19.4% | 29.3% | - |
| Degree of Saturation | 81.8% | 100.0% | - |
| Change in ω | - | 9.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.22 | cm |
| Primary Swell | - | 1.5% | % |
| Ultimate Swell | - | 9.0% | % |
| Volume | 21.51 | 21.84 | $cm^3$ |
| Change in Volume | - | 0.33 | $cm^3$ |
| Mass of Water Lost | - | 6.50 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.85% | %/log cycle |
| Slope of Secondary Swelling | 0.24% | %/log cycle |

| | |
|---|---|
| Primary Swell | 1.52% |
| Time to Swell (hr) | 3.34 |

| | |
|---|---|
| Stress (psf) | 579.7 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

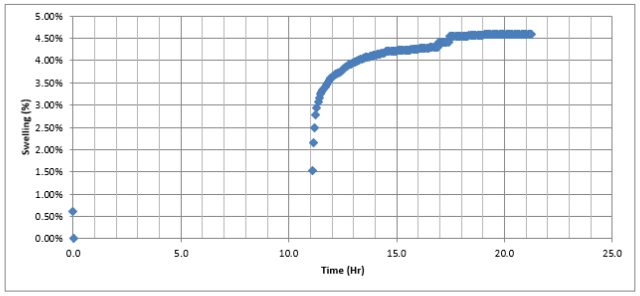
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.38 | g |
| Dry Unit Weight | 15.70 | $kN/m^3$ |
| Height of Sample | 10.312 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 47.60 | g's |
| Sample Height | - | 7.312 | mm |
| Testing Height | 10.279 | 10.254 | mm |
| Void Ratio, e | 0.687 | 0.683 | - |
| Moisture content, ω | 15.1% | 27.6% | - |
| Degree of Saturation | 59.4% | 97.5% | - |
| Change in ω | - | 12.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | #NAME? | #NAME? | cm |
| Primary Swell | - | -0.2% | % |
| Ultimate Swell | - | 4.6% | % |
| Volume | 20.83 | 20.78 | $cm^3$ |
| Change in Volume | - | -0.05 | $cm^3$ |
| Mass of Water Lost | - | -91.88 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.03% | %/log cycle |
| Slope of Secondary Swelling | -0.15% | %/log cycle |

| | |
|---|---|
| Primary Swell | -0.25% |
| Time to Swell (hr) | 3.70 |

| | |
|---|---|
| Stress (psf) | #NAME? |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

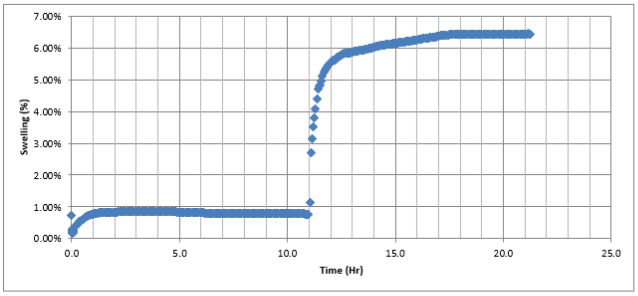
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.62 | g |
| Dry Unit Weight | 16.47 | kN/m$^3$ |
| Height of Sample | 10.612 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 48.06 | g's |
| Sample Height | - | 5.083 | mm |
| Testing Height | 10.588 | 10.680 | mm |
| Void Ratio, e | 0.608 | 0.622 | - |
| Moisture content, ω | 15.5% | 26.5% | - |
| Degree of Saturation | 68.9% | 100.0% | - |
| Change in ω | - | 11.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.52 | cm |
| Primary Swell | - | 0.9% | % |
| Ultimate Swell | - | 6.4% | % |
| Volume | 21.46 | 21.65 | cm$^3$ |
| Change in Volume | - | 0.18 | cm$^3$ |
| Mass of Water Lost | - | 4.16 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.24% | %/log cycle | Primary Swell | 0.86% | Stress (psf) | 859.7 |
| Slope of Secondary Swelling | -0.16% | %/log cycle | Time to Swell (hr) | 3.18 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

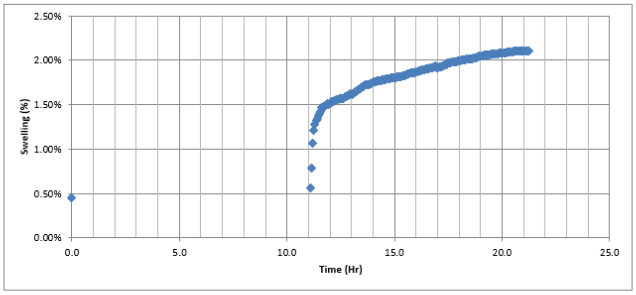
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.40 | g |
| Dry Unit Weight | 16.23 | kN/m$^3$ |
| Height of Sample | 10.617 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 48.07 | g's |
| Sample Height | - | 11.837 | mm |
| Testing Height | 10.594 | 10.513 | mm |
| Void Ratio, e | 0.632 | 0.619 | - |
| Moisture content, ω | 13.7% | 23.4% | - |
| Degree of Saturation | 58.6% | 94.7% | - |
| Change in ω | - | 9.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.50 | cm |
| Primary Swell | - | -0.8% | % |
| Ultimate Swell | - | 2.1% | % |
| Volume | 21.47 | 21.31 | cm$^3$ |
| Change in Volume | - | -0.16 | cm$^3$ |
| Mass of Water Lost | - | 5.27 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.09% | %/log cycle | Primary Swell | -0.76% | Stress (psf) | 1406.6 |
| Slope of Secondary Swelling | -0.18% | %/log cycle | Time to Swell (hr) | 4.12 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/24/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

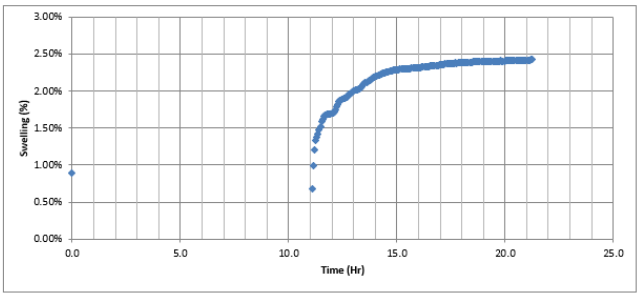
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B12 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.40 | g |
| Dry Unit Weight | 16.50 | kN/m$^3$ |
| Height of Sample | 10.475 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 47.64 | g's |
| Sample Height | - | 11.491 | mm |
| Testing Height | 10.450 | 10.192 | mm |
| Void Ratio, e | 0.605 | 0.565 | - |
| Moisture content, ω | 13.4% | 22.8% | - |
| Degree of Saturation | 59.7% | 95.7% | - |
| Change in ω | - | 9.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.29 | cm |
| Primary Swell | - | -2.5% | % |
| Ultimate Swell | - | 2.4% | % |
| Volume | 21.18 | 20.66 | cm$^3$ |
| Change in Volume | - | -0.52 | cm$^3$ |
| Mass of Water Lost | - | 4.44 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.01% | %/log cycle | Primary Swell | -2.47% | Stress (psf) | 1395.9 |
| Slope of Secondary Swelling | 0.00% | %/log cycle | Time to Swell (hr) | 2.86 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 1 |
| Cup Number | 1 |
| Conducted by | Shivangi |

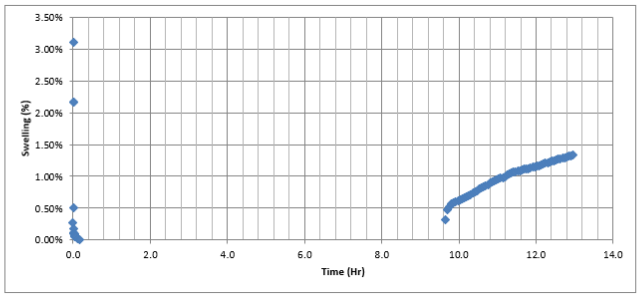
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.82 | g |
| Dry Unit Weight | 16.09 | kN/m$^3$ |
| Height of Sample | 10.678 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.21 | g's |
| Sample Height | - | 5.232 | mm |
| Testing Height | 10.653 | 10.633 | mm |
| Void Ratio, e | 0.646 | 0.643 | - |
| Moisture content, ω | 6.8% | 23.1% | - |
| Degree of Saturation | 28.3% | 93.3% | - |
| Change in ω | - | 16.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.30 | cm |
| Primary Swell | - | -0.2% | % |
| Ultimate Swell | - | 1.3% | % |
| Volume | 21.59 | 21.55 | cm$^3$ |
| Change in Volume | - | -0.04 | cm$^3$ |
| Mass of Water Lost | - | 2.03 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.14% | %/log cycle | Primary Swell | -0.18% | Stress (psf) | 162.9 |
| Slope of Secondary Swelling | -0.11% | %/log cycle | Time to Swell (hr) | 3.30 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 1 |
| Cup Number | 2 |
| Conducted by | Shivangi |

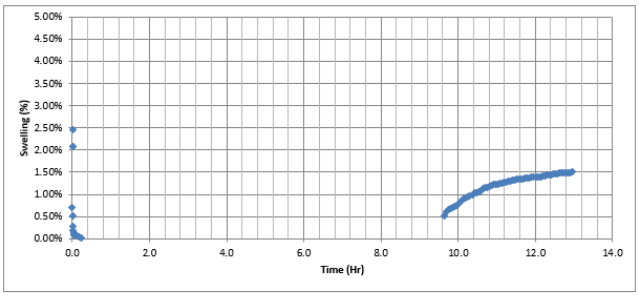
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.06 | g |
| Dry Unit Weight | 16.03 | kN/m$^3$ |
| Height of Sample | 10.353 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.22 | g's |
| Sample Height | - | 5.350 | mm |
| Testing Height | 10.294 | 10.280 | mm |
| Void Ratio, e | 0.652 | 0.650 | - |
| Moisture content, ω | 8.7% | 23.7% | - |
| Degree of Saturation | 36.1% | 94.6% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.32 | cm |
| Primary Swell | - | -0.1% | % |
| Ultimate Swell | - | 1.5% | % |
| Volume | 20.86 | 20.84 | cm$^3$ |
| Change in Volume | - | -0.03 | cm$^3$ |
| Mass of Water Lost | - | 3.19 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.09% | %/log cycle |
| Slope of Secondary Swelling | -0.14% | %/log cycle |

| | |
|---|---|
| Primary Swell | -0.13% |
| Time to Swell (hr) | 4.14 |

| | |
|---|---|
| Stress (psf) | 164.4 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 1 |
| Cup Number | 3 |
| Conducted by | Shivangi |

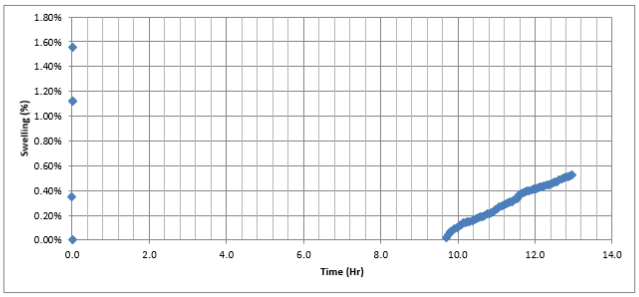
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.87 | g |
| Dry Unit Weight | 16.07 | kN/m$^3$ |
| Height of Sample | 10.297 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.26 | g's |
| Sample Height | - | 8.730 | mm |
| Testing Height | 10.278 | 10.214 | mm |
| Void Ratio, e | 0.648 | 0.638 | - |
| Moisture content, ω | 8.1% | 22.9% | - |
| Degree of Saturation | 33.6% | 94.3% | - |
| Change in ω | - | 14.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.34 | cm |
| Primary Swell | - | -0.6% | % |
| Ultimate Swell | - | 0.5% | % |
| Volume | 20.83 | 20.70 | cm$^3$ |
| Change in Volume | - | -0.13 | cm$^3$ |
| Mass of Water Lost | - | 2.19 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.10% | %/log cycle |
| Slope of Secondary Swelling | -0.31% | %/log cycle |

| | |
|---|---|
| Primary Swell | -0.62% |
| Time to Swell (hr) | 5.33 |

| | |
|---|---|
| Stress (psf) | 250.0 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 1 |
| Cup Number | 4 |
| Conducted by | Shivangi |

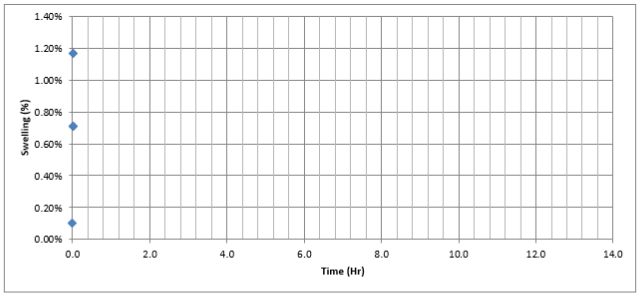
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.55 | g |
| Dry Unit Weight | 15.79 | kN/m$^3$ |
| Height of Sample | 10.709 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.43 | g's |
| Sample Height | - | 6.628 | mm |
| Testing Height | 10.692 | 10.596 | mm |
| Void Ratio, e | 0.678 | 0.663 | - |
| Moisture content, ω | 7.7% | 23.3% | - |
| Degree of Saturation | 30.6% | 93.0% | - |
| Change in ω | - | 15.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.57 | cm |
| Primary Swell | - | -0.9% | % |
| Ultimate Swell | - | -0.1% | % |
| Volume | 21.67 | 21.48 | cm$^3$ |
| Change in Volume | - | -0.19 | cm$^3$ |
| Mass of Water Lost | - | 2.34 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.29% | %/log cycle |
| Slope of Secondary Swelling | -0.17% | %/log cycle |

| | |
|---|---|
| Primary Swell | -0.90% |
| Time to Swell (hr) | 3.54 |

| | |
|---|---|
| Stress (psf) | 252.8 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 1 |
| Cup Number | 5 |
| Conducted by | Shivangi |

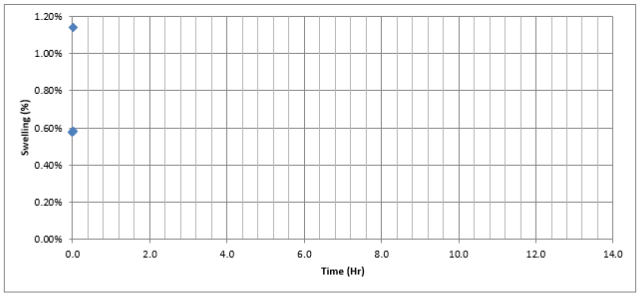
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.07 | g |
| Dry Unit Weight | 15.44 | kN/m$^3$ |
| Height of Sample | 10.825 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.44 | g's |
| Sample Height | - | 12.441 | mm |
| Testing Height | 10.800 | 10.619 | mm |
| Void Ratio, e | 0.715 | 0.686 | - |
| Moisture content, ω | 7.6% | 23.0% | - |
| Degree of Saturation | 28.6% | 88.0% | - |
| Change in ω | - | 15.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.59 | cm |
| Primary Swell | - | -1.7% | % |
| Ultimate Swell | - | -0.6% | % |
| Volume | 21.89 | 21.52 | cm$^3$ |
| Change in Volume | - | -0.36 | cm$^3$ |
| Mass of Water Lost | - | 1.69 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.39% | %/log cycle |
| Slope of Secondary Swelling | -0.13% | %/log cycle |

| | |
|---|---|
| Primary Swell | -1.67% |
| Time to Swell (hr) | 4.21 |

| | |
|---|---|
| Stress (psf) | 413.2 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 1 |
| Cup Number | 6 |
| Conducted by | Shivangi |

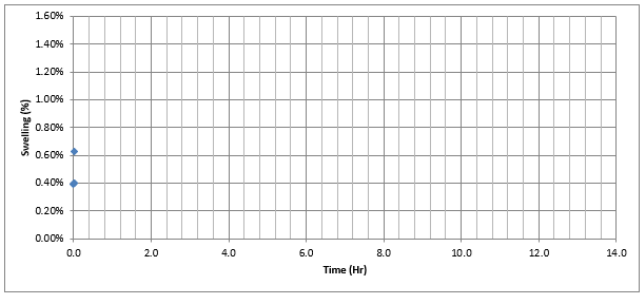
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 0-2' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.21 | g |
| Dry Unit Weight | 15.70 | $kN/m^3$ |
| Height of Sample | 10.790 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 19.25 | g's |
| Sample Height | - | 11.761 | mm |
| Testing Height | 10.762 | 10.617 | mm |
| Void Ratio, e | 0.688 | 0.665 | - |
| Moisture content, ω | 6.6% | 23.3% | - |
| Degree of Saturation | 26.0% | 92.8% | - |
| Change in ω | - | 16.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.30 | cm |
| Primary Swell | - | -1.4% | % |
| Ultimate Swell | - | -0.5% | % |
| Volume | 21.81 | 21.52 | $cm^3$ |
| Change in Volume | - | -0.30 | $cm^3$ |
| Mass of Water Lost | - | 3.09 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.19% | %/log cycle |
| Slope of Secondary Swelling | -0.12% | %/log cycle |

| | |
|---|---|
| Primary Swell | -1.35% |
| Time to Swell (hr) | 5.08 |

| | |
|---|---|
| Stress (psf) | 407.9 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Shivangi |

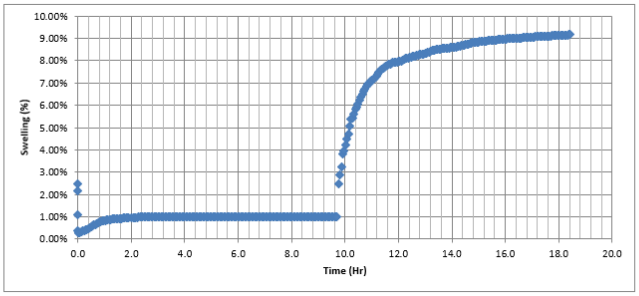
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.76 | g |
| Dry Unit Weight | 17.46 | kN/m$^3$ |
| Height of Sample | 10.871 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.56 | g's |
| Sample Height | - | 3.641 | mm |
| Testing Height | 10.848 | 10.956 | mm |
| Void Ratio, e | 0.517 | 0.532 | - |
| Moisture content, ω | 9.3% | 24.5% | - |
| Degree of Saturation | 48.4% | 100.0% | - |
| Change in ω | - | 15.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.55 | cm |
| Primary Swell | - | 1.0% | % |
| Ultimate Swell | - | 9.2% | % |
| Volume | 21.99 | 22.21 | cm$^3$ |
| Change in Volume | - | 0.22 | cm$^3$ |
| Mass of Water Lost | - | 2.29 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.73% | %/log cycle | Primary Swell | 0.99% | Stress (psf) | 357.0 |
| Slope of Secondary Swelling | 0.03% | %/log cycle | Time to Swell (hr) | 2.04 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Shivangi |

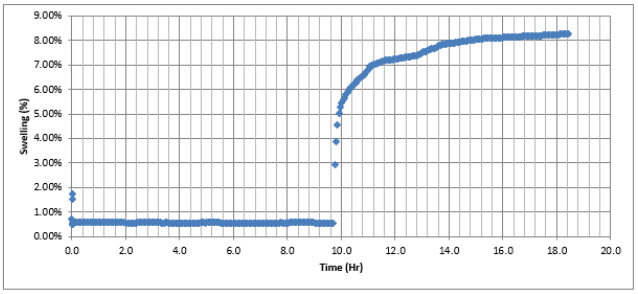
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.76 | g |
| Dry Unit Weight | 16.76 | kN/m$^3$ |
| Height of Sample | 10.795 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.30 | g's |
| Sample Height | - | 3.219 | mm |
| Testing Height | 10.764 | 10.825 | mm |
| Void Ratio, e | 0.580 | 0.589 | - |
| Moisture content, ω | 9.3% | 25.3% | - |
| Degree of Saturation | 43.4% | 96.1% | - |
| Change in ω | - | 16.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.37 | cm |
| Primary Swell | - | 0.6% | % |
| Ultimate Swell | - | 8.3% | % |
| Volume | 21.82 | 21.94 | cm$^3$ |
| Change in Volume | - | 0.12 | cm$^3$ |
| Mass of Water Lost | - | 2.10 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.05% | %/log cycle | Primary Swell | 0.56% | Stress (psf) | 348.7 |
| Slope of Secondary Swelling | -0.01% | %/log cycle | Time to Swell (hr) | 2.04 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | Shivangi |

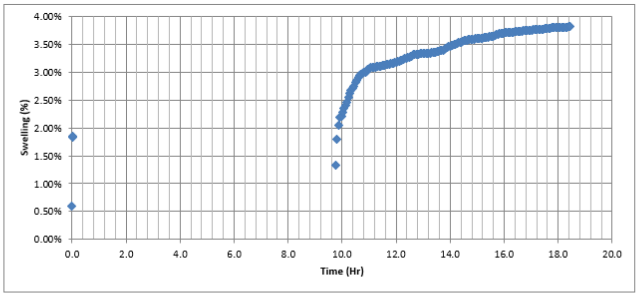
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.35 | g |
| Dry Unit Weight | 16.00 | $kN/m^3$ |
| Height of Sample | 10.668 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.55 | g's |
| Sample Height | - | 4.340 | mm |
| Testing Height | 10.652 | 10.566 | mm |
| Void Ratio, e | 0.655 | 0.642 | - |
| Moisture content, ω | 8.9% | 24.4% | - |
| Degree of Saturation | 36.6% | 91.9% | - |
| Change in ω | - | 15.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.22 | cm |
| Primary Swell | - | -0.8% | % |
| Ultimate Swell | - | 3.8% | % |
| Volume | 21.59 | 21.42 | $cm^3$ |
| Change in Volume | - | -0.17 | $cm^3$ |
| Mass of Water Lost | - | 2.29 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.17% | %/log cycle |
| Slope of Secondary Swelling | -0.02% | %/log cycle |

| | |
|---|---|
| Primary Swell | -0.80% |
| Time to Swell (hr) | 1.66 |

| | |
|---|---|
| Stress (psf) | 519.6 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | Shivangi |

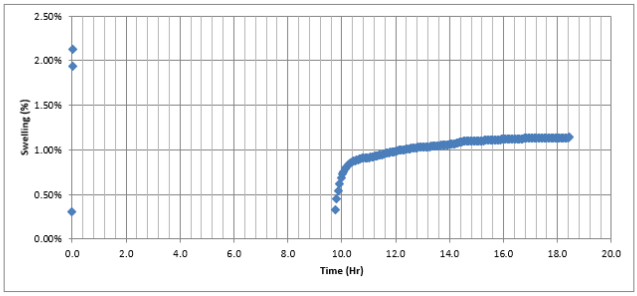
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.00 | g |
| Dry Unit Weight | 15.88 | kN/m$^3$ |
| Height of Sample | 10.754 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.90 | g's |
| Sample Height | - | 4.115 | mm |
| Testing Height | 10.728 | 10.629 | mm |
| Void Ratio, e | 0.668 | 0.653 | - |
| Moisture content, ω | 8.0% | 22.3% | - |
| Degree of Saturation | 32.3% | 87.6% | - |
| Change in ω | - | 14.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.21 | 3.50 | cm |
| Primary Swell | - | -0.9% | % |
| Ultimate Swell | - | 1.1% | % |
| Volume | 21.74 | 21.54 | cm$^3$ |
| Change in Volume | - | -0.20 | cm$^3$ |
| Mass of Water Lost | - | 3.86 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.17% | %/log cycle | Primary Swell | -0.92% | Stress (psf) | 523.1 |
| Slope of Secondary Swelling | -0.09% | %/log cycle | Time to Swell (hr) | 2.67 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Shivangi |

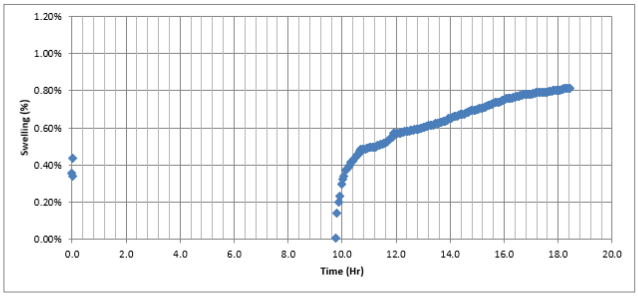
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.64 | g |
| Dry Unit Weight | 16.05 | kN/m$^3$ |
| Height of Sample | 10.770 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.43 | g's |
| Sample Height | - | 8.610 | mm |
| Testing Height | 10.760 | 10.635 | mm |
| Void Ratio, e | 0.650 | 0.631 | - |
| Moisture content, ω | 8.3% | 20.6% | - |
| Degree of Saturation | 34.3% | 83.7% | - |
| Change in ω | - | 12.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 2.97 | cm |
| Primary Swell | - | -1.2% | % |
| Ultimate Swell | - | 0.8% | % |
| Volume | 21.81 | 21.55 | cm$^3$ |
| Change in Volume | - | -0.25 | cm$^3$ |
| Mass of Water Lost | - | 5.70 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.07% | %/log cycle | Primary Swell | -1.16% | Stress (psf) | 860.7 |
| Slope of Secondary Swelling | -0.04% | %/log cycle | Time to Swell (hr) | 2.19 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Shivangi |

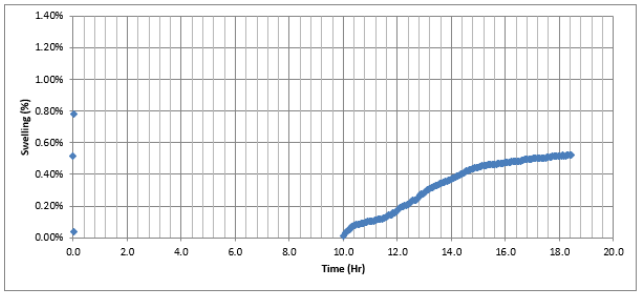
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B1 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.29 | g |
| Dry Unit Weight | 15.62 | kN/m$^3$ |
| Height of Sample | 10.704 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 29.90 | g's |
| Sample Height | - | 7.652 | mm |
| Testing Height | 10.691 | 10.480 | mm |
| Void Ratio, e | 0.696 | 0.662 | - |
| Moisture content, ω | 8.1% | 23.1% | - |
| Degree of Saturation | 31.4% | 88.4% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.43 | cm |
| Primary Swell | - | -2.0% | % |
| Ultimate Swell | - | 0.5% | % |
| Volume | 21.67 | 21.24 | cm$^3$ |
| Change in Volume | - | -0.43 | cm$^3$ |
| Mass of Water Lost | - | 4.99 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.03% | %/log cycle | Primary Swell | -1.97% | Stress (psf) | 881.8 |
| Slope of Secondary Swelling | -0.04% | %/log cycle | Time to Swell (hr) | 3.46 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

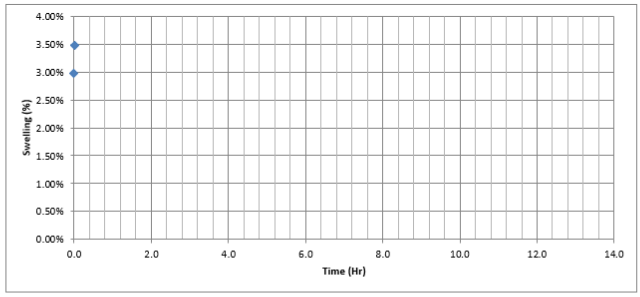
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 34.01 | g |
| Dry Unit Weight | 14.55 | kN/m$^3$ |
| Height of Sample | 10.729 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 72.95 | g's |
| Sample Height | - | 5.221 | mm |
| Testing Height | 10.720 | 10.287 | mm |
| Void Ratio, e | 0.821 | 0.747 | - |
| Moisture content, ω | 5.6% | 27.2% | - |
| Degree of Saturation | 18.3% | 94.9% | - |
| Change in ω | - | 21.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.42 | cm |
| Primary Swell | - | -4.0% | % |
| Ultimate Swell | - | -2.7% | % |
| Volume | 21.73 | 20.85 | cm$^3$ |
| Change in Volume | - | -0.88 | cm$^3$ |
| Mass of Water Lost | - | 3.80 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.08% | %/log cycle | Primary Swell | -4.04% | Stress (psf) | 575.5 |
| Slope of Secondary Swelling | -0.03% | %/log cycle | Time to Swell (hr) | 1.35 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

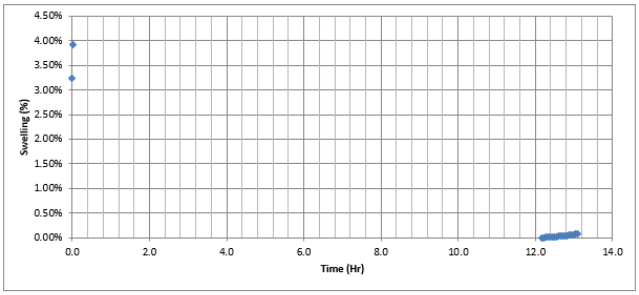
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.04 | g |
| Dry Unit Weight | 14.83 | kN/m$^3$ |
| Height of Sample | 10.775 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 72.96 | g's |
| Sample Height | - | 5.128 | mm |
| Testing Height | 10.763 | 10.493 | mm |
| Void Ratio, e | 0.786 | 0.741 | - |
| Moisture content, ω | 6.2% | 27.8% | - |
| Degree of Saturation | 21.5% | 95.4% | - |
| Change in ω | - | 21.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.37 | cm |
| Primary Swell | - | -2.5% | % |
| Ultimate Swell | - | 0.1% | % |
| Volume | 21.81 | 21.27 | cm$^3$ |
| Change in Volume | - | -0.55 | cm$^3$ |
| Mass of Water Lost | - | 3.76 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.07% | %/log cycle | Primary Swell | -2.51% | Stress (psf) | 576.1 |
| Slope of Secondary Swelling | -0.05% | %/log cycle | Time to Swell (hr) | 2.00 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

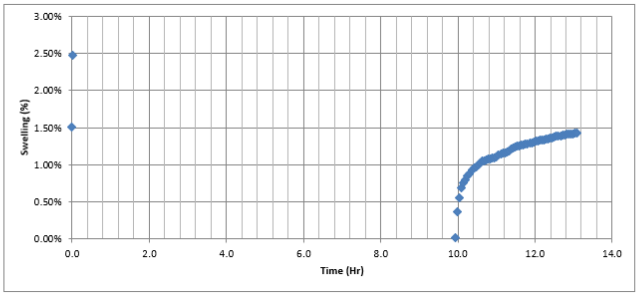
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.60 | g |
| Dry Unit Weight | 15.48 | kN/m$^3$ |
| Height of Sample | 10.780 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 72.97 | g's |
| Sample Height | - | 7.737 | mm |
| Testing Height | 10.774 | 10.587 | mm |
| Void Ratio, e | 0.711 | 0.681 | - |
| Moisture content, ω | 9.1% | 25.7% | - |
| Degree of Saturation | 34.6% | 94.5% | - |
| Change in ω | - | 16.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.48 | cm |
| Primary Swell | - | -1.7% | % |
| Ultimate Swell | - | 1.4% | % |
| Volume | 21.84 | 21.46 | cm$^3$ |
| Change in Volume | - | -0.38 | cm$^3$ |
| Mass of Water Lost | - | 3.04 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.07% | %/log cycle | Primary Swell | -1.74% | Stress (psf) | 875.1 |
| Slope of Secondary Swelling | -0.03% | %/log cycle | Time to Swell (hr) | 1.17 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

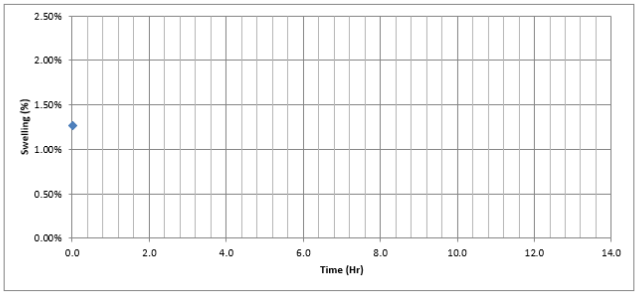
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.54 | g |
| Dry Unit Weight | 15.26 | $kN/m^3$ |
| Height of Sample | 10.709 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 72.27 | g's |
| Sample Height | - | 4.762 | mm |
| Testing Height | 10.711 | 10.435 | mm |
| Void Ratio, e | 0.735 | 0.691 | - |
| Moisture content, ω | 8.2% | 23.5% | - |
| Degree of Saturation | 30.0% | 88.7% | - |
| Change in ω | - | 15.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.16 | cm |
| Primary Swell | - | -2.6% | % |
| Ultimate Swell | - | -1.1% | % |
| Volume | 21.71 | 21.15 | $cm^3$ |
| Change in Volume | - | -0.56 | $cm^3$ |
| Mass of Water Lost | - | 3.87 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.08% | %/log cycle | Primary Swell | -2.58% | Stress (psf) | 863.3 |
| Slope of Secondary Swelling | 0.02% | %/log cycle | Time to Swell (hr) | 1.44 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

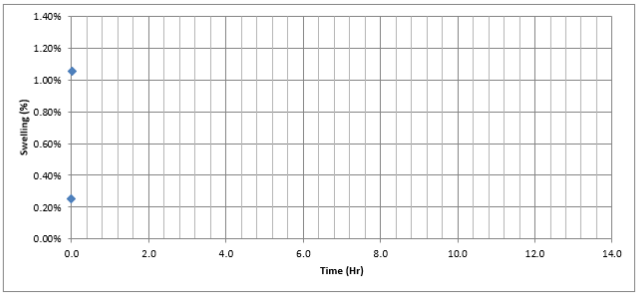
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 36.62 | g |
| Dry Unit Weight | 15.12 | $kN/m^3$ |
| Height of Sample | 10.775 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 72.96 | g's |
| Sample Height | - | 11.713 | mm |
| Testing Height | 10.763 | 10.484 | mm |
| Void Ratio, e | 0.752 | 0.707 | - |
| Moisture content, ω | 8.9% | 22.0% | - |
| Degree of Saturation | 32.0% | 81.5% | - |
| Change in ω | - | 13.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.17 | cm |
| Primary Swell | - | -2.6% | % |
| Ultimate Swell | - | -1.2% | % |
| Volume | 21.81 | 21.25 | $cm^3$ |
| Change in Volume | - | -0.57 | $cm^3$ |
| Mass of Water Lost | - | 6.83 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.09% | %/log cycle | Primary Swell | -2.59% | Stress (psf) | 1437.7 |
| Slope of Secondary Swelling | -0.08% | %/log cycle | Time to Swell (hr) | 1.85 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/25/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

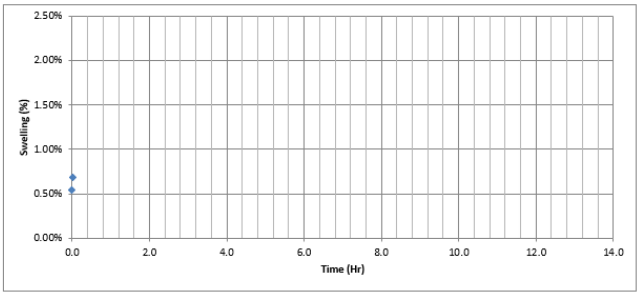
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B13 | |
| Depth | 8-10' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 33.68 | g |
| Dry Unit Weight | 14.40 | $kN/m^3$ |
| Height of Sample | 10.663 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 72.40 | g's |
| Sample Height | - | 11.351 | mm |
| Testing Height | 10.628 | 10.152 | mm |
| Void Ratio, e | 0.840 | 0.758 | - |
| Moisture content, ω | 6.5% | 24.5% | - |
| Degree of Saturation | 21.1% | 84.4% | - |
| Change in ω | - | 17.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.10 | cm |
| Primary Swell | - | -4.5% | % |
| Ultimate Swell | - | -3.1% | % |
| Volume | 21.54 | 20.58 | $cm^3$ |
| Change in Volume | - | -0.96 | $cm^3$ |
| Mass of Water Lost | - | 3.94 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.11% | %/log cycle | Primary Swell | -4.47% | Stress (psf) | 1428.0 |
| Slope of Secondary Swelling | -0.06% | %/log cycle | Time to Swell (hr) | 1.53 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Shivangi |

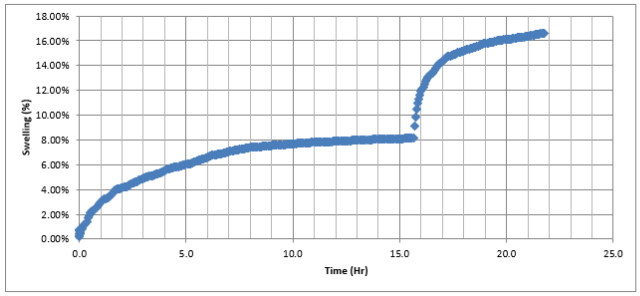
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.77 | g |
| Dry Unit Weight | 16.43 | $kN/m^3$ |
| Height of Sample | 10.485 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.05 | g's |
| Sample Height | - | 3.170 | mm |
| Testing Height | 10.431 | 11.219 | mm |
| Void Ratio, e | 0.612 | 0.734 | - |
| Moisture content, ω | 20.8% | 34.6% | - |
| Degree of Saturation | 91.8% | 100.0% | - |
| Change in ω | - | 13.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.26 | cm |
| Primary Swell | - | 7.6% | % |
| Ultimate Swell | - | 16.6% | % |
| Volume | 21.14 | 22.74 | $cm^3$ |
| Change in Volume | - | 1.60 | $cm^3$ |
| Mass of Water Lost | - | 3.91 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.36% | %/log cycle | Primary Swell | 7.56% | Stress (psf) | 243.0 |
| Slope of Secondary Swelling | 2.50% | %/log cycle | Time to Swell (hr) | 8.86 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Shivangi |

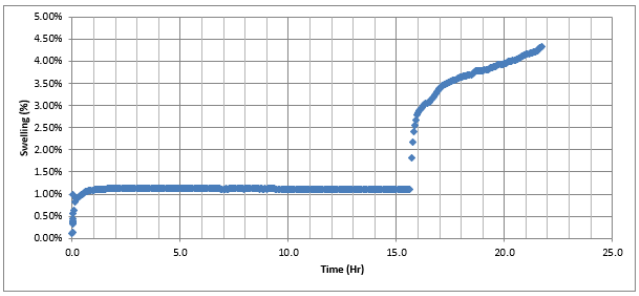
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.28 | g |
| Dry Unit Weight | 16.67 | kN/m$^3$ |
| Height of Sample | 10.922 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.02 | g's |
| Sample Height | - | 3.501 | mm |
| Testing Height | 10.888 | 11.010 | mm |
| Void Ratio, e | 0.589 | 0.607 | - |
| Moisture content, ω | 10.1% | 23.8% | - |
| Degree of Saturation | 46.2% | 97.7% | - |
| Change in ω | - | 13.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.29 | cm |
| Primary Swell | - | 1.1% | % |
| Ultimate Swell | - | 4.3% | % |
| Volume | 22.07 | 22.32 | cm$^3$ |
| Change in Volume | - | 0.25 | cm$^3$ |
| Mass of Water Lost | - | 3.47 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.13% | %/log cycle |
| Slope of Secondary Swelling | -0.04% | %/log cycle |

| | |
|---|---|
| Primary Swell | 1.13% |
| Time to Swell (hr) | 4.07 |

| | |
|---|---|
| Stress (psf) | 247.0 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Shivangi |

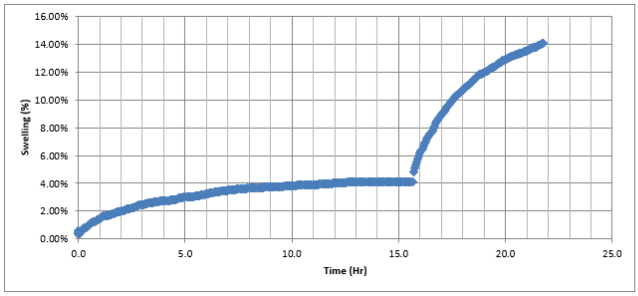
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 41.93 | g |
| Dry Unit Weight | 16.06 | kN/m$^3$ |
| Height of Sample | 10.551 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.34 | g's |
| Sample Height | - | 8.208 | mm |
| Testing Height | 10.505 | 10.907 | mm |
| Void Ratio, e | 0.649 | 0.712 | - |
| Moisture content, ω | 20.3% | 32.8% | - |
| Degree of Saturation | 84.4% | 100.0% | - |
| Change in ω | - | 12.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.42 | cm |
| Primary Swell | - | 3.8% | % |
| Ultimate Swell | - | 14.0% | % |
| Volume | 21.29 | 22.11 | cm$^3$ |
| Change in Volume | - | 0.81 | cm$^3$ |
| Mass of Water Lost | - | 5.84 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 2.12% | %/log cycle |
| Slope of Secondary Swelling | 1.71% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.83% |
| Time to Swell (hr) | 10.14 |

| | |
|---|---|
| Stress (psf) | 618.0 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Shivangi |

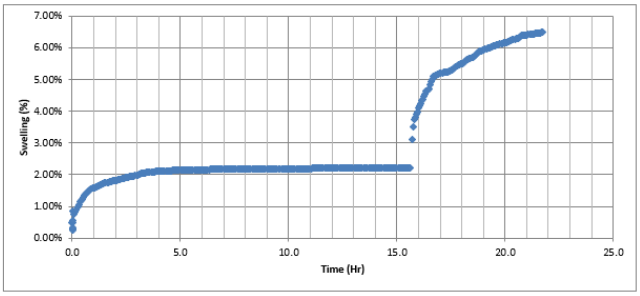
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 2-4' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.45 | g |
| Dry Unit Weight | 15.70 | kN/m$^3$ |
| Height of Sample | 10.587 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.06 | g's |
| Sample Height | - | 7.837 | mm |
| Testing Height | 10.545 | 10.772 | mm |
| Void Ratio, e | 0.687 | 0.724 | - |
| Moisture content, ω | 15.4% | 30.2% | - |
| Degree of Saturation | 60.3% | 100.0% | - |
| Change in ω | - | 14.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.30 | cm |
| Primary Swell | - | 2.2% | % |
| Ultimate Swell | - | 6.5% | % |
| Volume | 21.37 | 21.83 | cm$^3$ |
| Change in Volume | - | 0.46 | cm$^3$ |
| Mass of Water Lost | - | 2.92 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.87% | %/log cycle | Primary Swell | 2.16% | Stress (psf) 604.2 |
| Slope of Secondary Swelling | 0.14% | %/log cycle | Time to Swell (hr) | 5.31 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Shivangi |

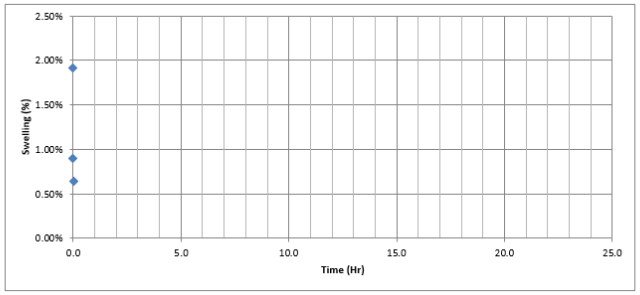
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 35.82 | g |
| Dry Unit Weight | 16.01 | kN/m$^3$ |
| Height of Sample | 10.140 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 38.34 | g's |
| Sample Height | - | 5.328 | mm |
| Testing Height | 10.137 | 9.875 | mm |
| Void Ratio, e | 0.654 | 0.612 | - |
| Moisture content, ω | 6.8% | 25.4% | - |
| Degree of Saturation | 28.2% | 100.0% | - |
| Change in ω | - | 18.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 3.38 | cm |
| Primary Swell | - | -2.6% | % |
| Ultimate Swell | - | -1.4% | % |
| Volume | 20.55 | 20.02 | cm$^3$ |
| Change in Volume | - | -0.53 | cm$^3$ |
| Mass of Water Lost | - | 5.68 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | -0.05% | %/log cycle | Primary Swell | -2.58% | Stress (psf) 321.9 |
| Slope of Secondary Swelling | -0.10% | %/log cycle | Time to Swell (hr) | 4.66 | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Shivangi |

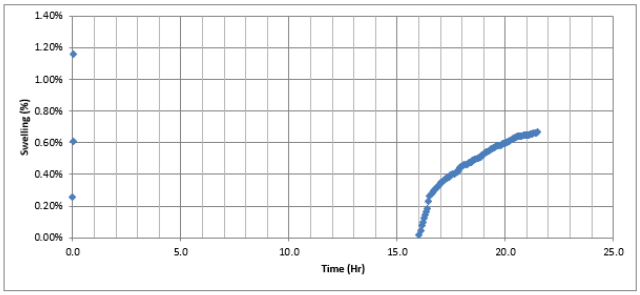
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.67 | g |
| Dry Unit Weight | 15.17 | $kN/m^3$ |
| Height of Sample | 10.841 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 38.28 | g's |
| Sample Height | - | 5.223 | mm |
| Testing Height | 10.835 | 10.693 | mm |
| Void Ratio, e | 0.746 | 0.723 | - |
| Moisture content, ω | 10.9% | 26.9% | - |
| Degree of Saturation | 39.5% | 95.7% | - |
| Change in ω | - | 15.9% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.39 | cm |
| Primary Swell | - | -1.3% | % |
| Ultimate Swell | - | 0.7% | % |
| Volume | 21.96 | 21.67 | $cm^3$ |
| Change in Volume | - | -0.29 | $cm^3$ |
| Mass of Water Lost | - | 4.79 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.11% | %/log cycle |
| Slope of Secondary Swelling | -0.19% | %/log cycle |

| | |
|---|---|
| Primary Swell | -1.31% |
| Time to Swell (hr) | 5.80 |

| | |
|---|---|
| Stress (psf) | 324.1 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Shivangi |

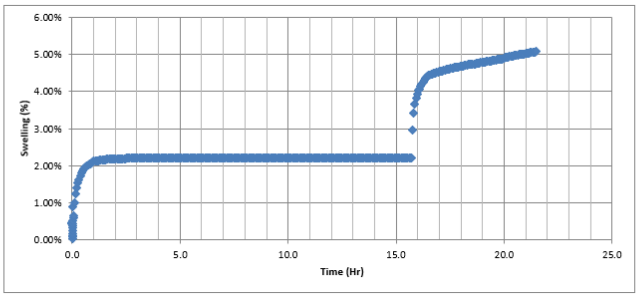
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.14 | g |
| Dry Unit Weight | 15.15 | $kN/m^3$ |
| Height of Sample | 10.734 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.85 | g's |
| Sample Height | - | 7.774 | mm |
| Testing Height | 10.731 | 10.968 | mm |
| Void Ratio, e | 0.749 | 0.787 | - |
| Moisture content, ω | 16.6% | 30.6% | - |
| Degree of Saturation | 59.7% | 98.7% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.42 | cm |
| Primary Swell | - | 2.2% | % |
| Ultimate Swell | - | 5.1% | % |
| Volume | 21.75 | 22.23 | $cm^3$ |
| Change in Volume | - | 0.48 | $cm^3$ |
| Mass of Water Lost | - | 4.99 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 0.60% | %/log cycle |
| Slope of Secondary Swelling | -0.01% | %/log cycle |

| | |
|---|---|
| Primary Swell | 2.22% |
| Time to Swell (hr) | 2.43 |

| | |
|---|---|
| Stress (psf) | 320.1 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Shivangi |

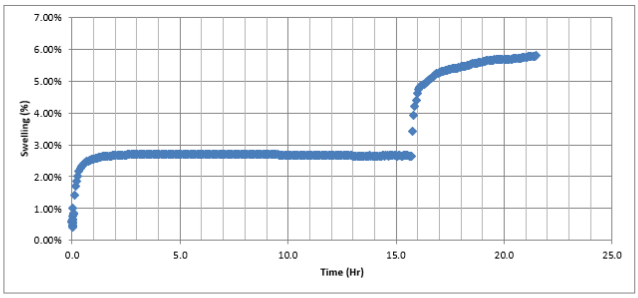
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.56 | g |
| Dry Unit Weight | 15.37 | kN/m$^3$ |
| Height of Sample | 10.577 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.57 | g's |
| Sample Height | - | 5.060 | mm |
| Testing Height | 10.571 | 10.858 | mm |
| Void Ratio, e | 0.723 | 0.770 | - |
| Moisture content, ω | 14.8% | 28.2% | - |
| Degree of Saturation | 55.4% | 92.7% | - |
| Change in ω | - | 13.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.35 | cm |
| Primary Swell | - | 2.7% | % |
| Ultimate Swell | - | 5.8% | % |
| Volume | 21.43 | 22.01 | cm$^3$ |
| Change in Volume | - | 0.58 | cm$^3$ |
| Mass of Water Lost | - | 3.03 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.45% | %/log cycle | Primary Swell | 2.71% | Stress (psf) | 322.2 |
| Slope of Secondary Swelling | -0.10% | %/log cycle | Time to Swell (hr) | 3.75 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Shivangi |

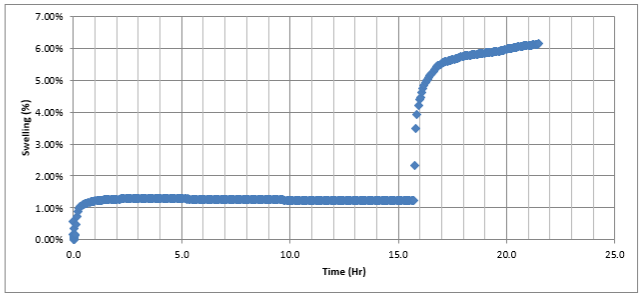
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 40.24 | g |
| Dry Unit Weight | 15.48 | kN/m$^3$ |
| Height of Sample | 10.739 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 38.29 | g's |
| Sample Height | - | 11.698 | mm |
| Testing Height | 10.739 | 10.878 | mm |
| Void Ratio, e | 0.711 | 0.733 | - |
| Moisture content, ω | 17.2% | 28.9% | - |
| Degree of Saturation | 65.2% | 95.7% | - |
| Change in ω | - | 11.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 3.12 | cm |
| Primary Swell | - | 1.3% | % |
| Ultimate Swell | - | 6.1% | % |
| Volume | 21.77 | 22.05 | cm$^3$ |
| Change in Volume | - | 0.28 | cm$^3$ |
| Mass of Water Lost | - | 8.36 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.21% | %/log cycle | Primary Swell | 1.29% | Stress (psf) | 812.0 |
| Slope of Secondary Swelling | -0.10% | %/log cycle | Time to Swell (hr) | 4.03 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 4/26/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Shivangi |

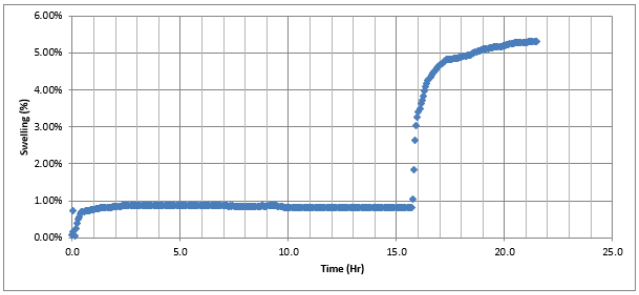
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B15 | |
| Depth | 4-6' | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.26 | g |
| Dry Unit Weight | 14.72 | kN/m$^3$ |
| Height of Sample | 10.663 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 37.92 | g's |
| Sample Height | - | 11.539 | mm |
| Testing Height | 10.657 | 10.752 | mm |
| Void Ratio, e | 0.799 | 0.815 | - |
| Moisture content, ω | 15.0% | 30.1% | - |
| Degree of Saturation | 50.5% | 90.8% | - |
| Change in ω | - | 15.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 3.12 | cm |
| Primary Swell | - | 0.9% | % |
| Ultimate Swell | - | 5.3% | % |
| Volume | 21.60 | 21.79 | cm$^3$ |
| Change in Volume | - | 0.19 | cm$^3$ |
| Mass of Water Lost | - | 3.09 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.25% | %/log cycle | Primary Swell | 0.89% | Stress (psf) | 798.3 |
| Slope of Secondary Swelling | -0.14% | %/log cycle | Time to Swell (hr) | 4.28 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Jenna |

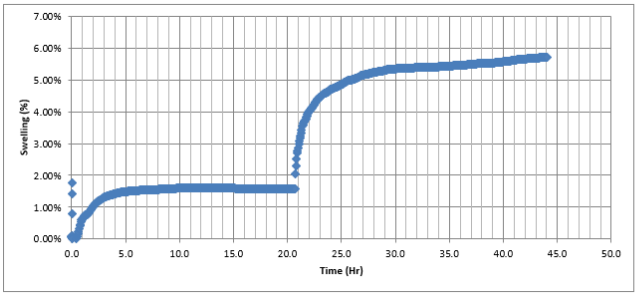
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 51.96 | g |
| Dry Unit Weight | 14.68 | kN/m$^3$ |
| Height of Sample | 15.377 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.71 | g's |
| Sample Height | - | 9.777 | mm |
| Testing Height | 14.885 | 15.652 | mm |
| Void Ratio, e | 0.804 | 0.897 | - |
| Moisture content, ω | 15.1% | 31.6% | - |
| Degree of Saturation | 50.6% | 94.1% | - |
| Change in ω | - | 16.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.14 | #NAME? | cm |
| Primary Swell | - | 5.2% | % |
| Ultimate Swell | - | 5.7% | % |
| Volume | 30.17 | 31.72 | cm$^3$ |
| Change in Volume | - | 1.55 | cm$^3$ |
| Mass of Water Lost | - | 6.29 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 22.54% | %/log cycle | Primary Swell | 5.15% | Stress (psf) | #NAME? |
| Slope of Secondary Swelling | 1.93% | %/log cycle | Time to Swell (hr) | 24.70 | | |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Jenna |

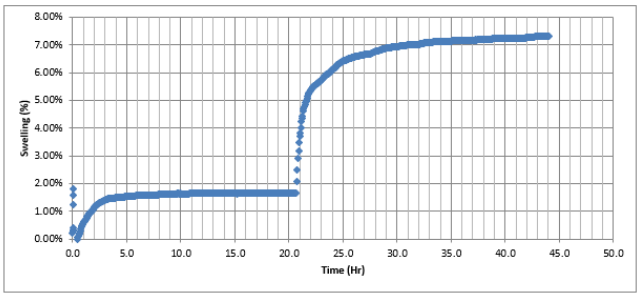
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.05 | g |
| Dry Unit Weight | 14.18 | $kN/m^3$ |
| Height of Sample | 12.334 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.65 | g's |
| Sample Height | - | 6.396 | mm |
| Testing Height | 11.823 | 12.595 | mm |
| Void Ratio, e | 0.867 | 0.989 | - |
| Moisture content, ω | 12.7% | 34.2% | - |
| Degree of Saturation | 39.5% | 92.0% | - |
| Change in ω | - | 21.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.03 | cm |
| Primary Swell | - | 6.5% | % |
| Ultimate Swell | - | 7.3% | % |
| Volume | 23.96 | 25.53 | $cm^3$ |
| Change in Volume | - | 1.56 | $cm^3$ |
| Mass of Water Lost | - | 6.20 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 33.42% | %/log cycle | Primary Swell | 6.53% | Stress (psf) | 41.5 |
| Slope of Secondary Swelling | 3.32% | %/log cycle | Time to Swell (hr) | 24.00 | | |

**Specimen:**

**Centrifuge Swelling Test**

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Jenna |

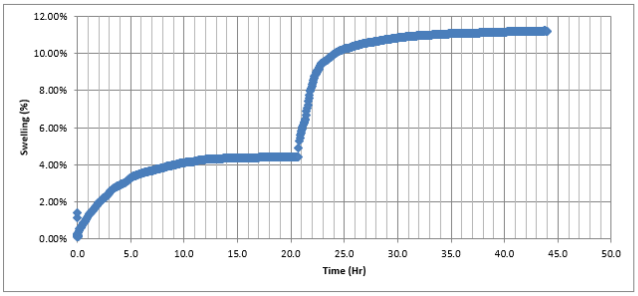
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 52.11 | g |
| Dry Unit Weight | 16.74 | $kN/m^3$ |
| Height of Sample | 13.645 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.82 | g's |
| Sample Height | - | 10.763 | mm |
| Testing Height | 13.381 | 14.816 | mm |
| Void Ratio, e | 0.582 | 0.752 | - |
| Moisture content, ω | 12.6% | 28.4% | - |
| Degree of Saturation | 58.4% | 100.0% | - |
| Change in ω | - | 15.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.23 | 3.19 | cm |
| Primary Swell | - | 10.7% | % |
| Ultimate Swell | - | 11.2% | % |
| Volume | 27.12 | 30.03 | $cm^3$ |
| Change in Volume | - | 2.91 | $cm^3$ |
| Mass of Water Lost | - | 8.44 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 39.61% | %/log cycle | Primary Swell | 10.73% | Stress (psf) | 62.5 |
| Slope of Secondary Swelling | 2.06% | %/log cycle | Time to Swell (hr) | 24.78 | | |

**Specimen:**

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Jenna |

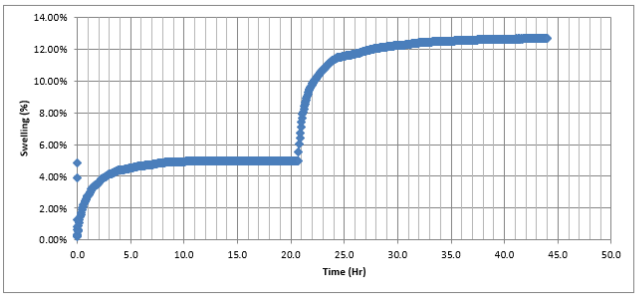
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.43 | g |
| Dry Unit Weight | 14.85 | kN/m$^3$ |
| Height of Sample | 11.537 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.67 | g's |
| Sample Height | - | 5.623 | mm |
| Testing Height | 11.099 | 12.448 | mm |
| Void Ratio, e | 0.783 | 1.000 | - |
| Moisture content, ω | 12.8% | 35.0% | - |
| Degree of Saturation | 44.2% | 93.6% | - |
| Change in ω | - | 22.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.26 | 3.51 | cm |
| Primary Swell | - | 12.2% | % |
| Ultimate Swell | - | 12.7% | % |
| Volume | 22.50 | 25.23 | cm$^3$ |
| Change in Volume | - | 2.73 | cm$^3$ |
| Mass of Water Lost | - | 4.41 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 44.85% | %/log cycle |
| Slope of Secondary Swelling | 2.26% | %/log cycle |

| | |
|---|---|
| Primary Swell | 12.16% |
| Time to Swell (hr) | 24.78 |

| | |
|---|---|
| Stress (psf) | 59.8 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Jenna |

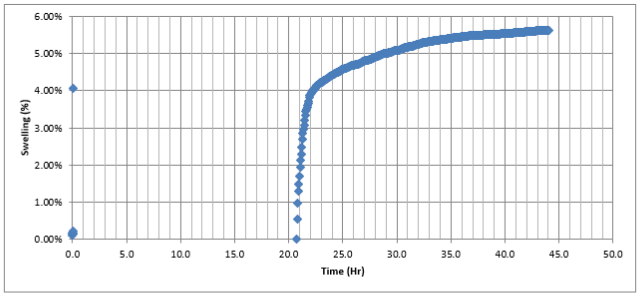
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 48.75 | g |
| Dry Unit Weight | 12.21 | kN/m$^3$ |
| Height of Sample | 12.863 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.66 | g's |
| Sample Height | - | 12.396 | mm |
| Testing Height | 12.272 | 12.875 | mm |
| Void Ratio, e | 1.170 | 1.277 | - |
| Moisture content, ω | 57.5% | 36.9% | - |
| Degree of Saturation | 100.0% | 77.2% | - |
| Change in ω | - | -20.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.09 | 2.17 | cm |
| Primary Swell | - | 4.9% | % |
| Ultimate Swell | - | 5.6% | % |
| Volume | 24.87 | 26.10 | cm$^3$ |
| Change in Volume | - | 1.22 | cm$^3$ |
| Mass of Water Lost | - | 15.10 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | 41.63% | %/log cycle |
| Slope of Secondary Swelling | 2.73% | %/log cycle |

| | |
|---|---|
| Primary Swell | 4.92% |
| Time to Swell (hr) | 23.55 |

| | |
|---|---|
| Stress (psf) | 97.0 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Jenna |

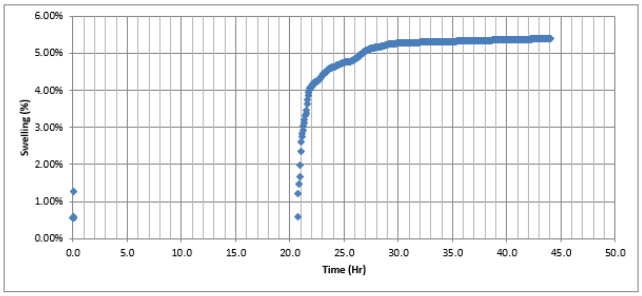
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 0-2 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 33.90 | g |
| Dry Unit Weight | 19.23 | kN/m$^3$ |
| Height of Sample | 11.034 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 28.92 | g's |
| Sample Height | - | 13.947 | mm |
| Testing Height | 10.764 | 11.305 | mm |
| Void Ratio, e | 0.377 | 0.446 | - |
| Moisture content, ω | -20.7% | 25.6% | - |
| Degree of Saturation | -148.4% | 100.0% | - |
| Change in ω | - | 46.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 3.41 | cm |
| Primary Swell | - | 5.0% | % |
| Ultimate Swell | - | 5.4% | % |
| Volume | 21.82 | 22.91 | cm$^3$ |
| Change in Volume | - | 1.10 | cm$^3$ |
| Mass of Water Lost | - | 6.00 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 39.24% | %/log cycle | Primary Swell | 5.03% | Stress (psf) | 99.7 |
| Slope of Secondary Swelling | 1.89% | %/log cycle | Time to Swell (hr) | 23.55 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 1 |
| Conducted by | Jenna |

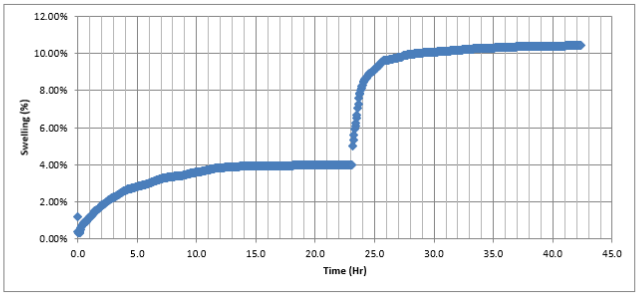
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 2- 4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 55.66 | g |
| Dry Unit Weight | 15.53 | kN/m$^3$ |
| Height of Sample | 14.732 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 30.70 | g's |
| Sample Height | - | 5.169 | mm |
| Testing Height | 14.504 | 15.069 | mm |
| Void Ratio, e | 0.706 | 0.772 | - |
| Moisture content, ω | 19.6% | 33.7% | - |
| Degree of Saturation | 75.0% | 100.0% | - |
| Change in ω | - | 14.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.33 | cm |
| Primary Swell | - | 3.9% | % |
| Ultimate Swell | - | 10.4% | % |
| Volume | 29.40 | 30.54 | cm$^3$ |
| Change in Volume | - | 1.15 | cm$^3$ |
| Mass of Water Lost | - | 4.97 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 2.56% | %/log cycle | Primary Swell | 3.90% | Stress (psf) | 363.2 |
| Slope of Secondary Swelling | 0.39% | %/log cycle | Time to Swell (hr) | 12.60 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 2 |
| Conducted by | Jenna |

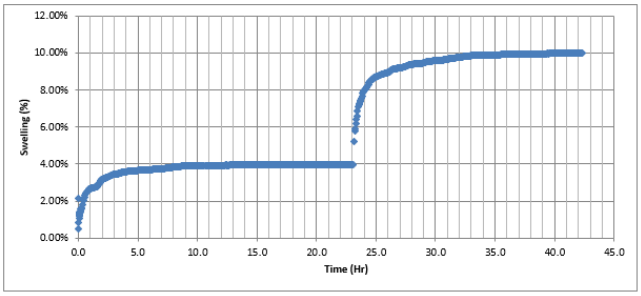
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 2- 4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 46.15 | g |
| Dry Unit Weight | 16.11 | kN/m$^3$ |
| Height of Sample | 12.182 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 30.52 | g's |
| Sample Height | - | 2.930 | mm |
| Testing Height | 11.575 | 12.031 | mm |
| Void Ratio, e | 0.644 | 0.709 | - |
| Moisture content, ω | 19.8% | 32.8% | - |
| Degree of Saturation | 83.0% | 100.0% | - |
| Change in ω | - | 13.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.16 | 3.10 | cm |
| Primary Swell | - | 3.9% | % |
| Ultimate Swell | - | 10.0% | % |
| Volume | 23.46 | 24.38 | cm$^3$ |
| Change in Volume | - | 0.92 | cm$^3$ |
| Mass of Water Lost | - | 5.79 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.28% | %/log cycle | Primary Swell | 3.94% | Stress (psf) | 351.7 |
| Slope of Secondary Swelling | 0.00% | %/log cycle | Time to Swell (hr) | 12.09 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 3 |
| Conducted by | Jenna |

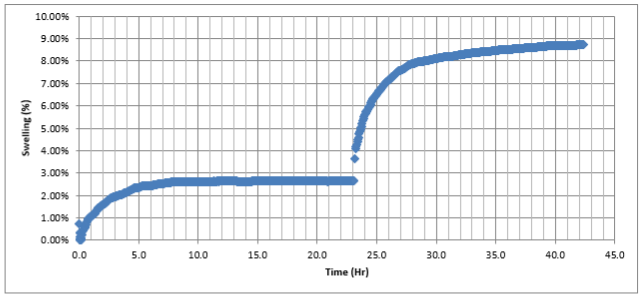
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 2- 4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 53.05 | g |
| Dry Unit Weight | 15.54 | kN/m$^3$ |
| Height of Sample | 14.387 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 30.47 | g's |
| Sample Height | - | 8.222 | mm |
| Testing Height | 13.890 | 15.007 | mm |
| Void Ratio, e | 0.705 | 0.842 | - |
| Moisture content, ω | 19.0% | 31.4% | - |
| Degree of Saturation | 72.7% | 99.5% | - |
| Change in ω | - | 12.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.19 | 2.89 | cm |
| Primary Swell | - | 8.0% | % |
| Ultimate Swell | - | 8.7% | % |
| Volume | 28.15 | 30.42 | cm$^3$ |
| Change in Volume | - | 2.27 | cm$^3$ |
| Mass of Water Lost | - | 9.87 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 38.39% | %/log cycle | Primary Swell | 8.05% | Stress (psf) | 73.6 |
| Slope of Secondary Swelling | 3.93% | %/log cycle | Time to Swell (hr) | 27.55 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 4 |
| Conducted by | Jenna |

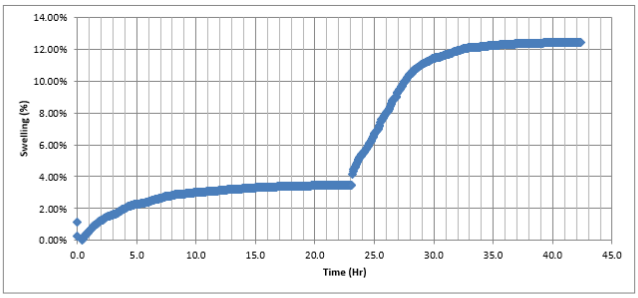
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 2- 4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 54.03 | g |
| Dry Unit Weight | 16.19 | kN/m$^3$ |
| Height of Sample | 13.929 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 30.86 | g's |
| Sample Height | - | 7.584 | mm |
| Testing Height | 13.525 | 15.136 | mm |
| Void Ratio, e | 0.636 | 0.831 | - |
| Moisture content, ω | 19.4% | 33.6% | - |
| Degree of Saturation | 82.4% | 100.0% | - |
| Change in ω | - | 14.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.21 | 3.15 | cm |
| Primary Swell | - | 11.9% | % |
| Ultimate Swell | - | 12.4% | % |
| Volume | 27.41 | 30.68 | cm$^3$ |
| Change in Volume | - | 3.26 | cm$^3$ |
| Mass of Water Lost | - | 8.42 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 46.72% | %/log cycle | Primary Swell | 11.91% | Stress (psf) | 78.5 |
| Slope of Secondary Swelling | 4.49% | %/log cycle | Time to Swell (hr) | 30.23 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 5 |
| Conducted by | Jenna |

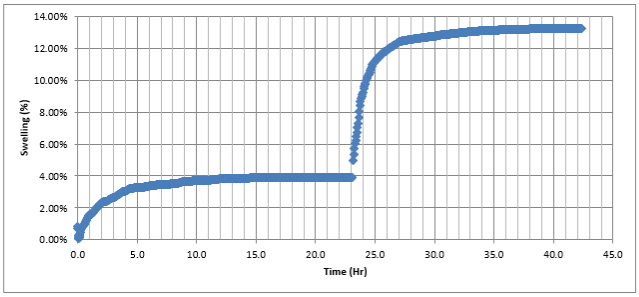
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 2- 4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.34 | g |
| Dry Unit Weight | 15.84 | kN/m$^3$ |
| Height of Sample | 12.009 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 30.89 | g's |
| Sample Height | - | 9.900 | mm |
| Testing Height | 11.654 | 13.141 | mm |
| Void Ratio, e | 0.672 | 0.885 | - |
| Moisture content, ω | 18.9% | 33.8% | - |
| Degree of Saturation | 75.8% | 100.0% | - |
| Change in ω | - | 15.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.82 | cm |
| Primary Swell | - | 12.8% | % |
| Ultimate Swell | - | 13.2% | % |
| Volume | 23.62 | 26.63 | cm$^3$ |
| Change in Volume | - | 3.01 | cm$^3$ |
| Mass of Water Lost | - | 12.63 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 70.68% | %/log cycle | Primary Swell | 12.75% | Stress (psf) | 120.1 |
| Slope of Secondary Swelling | 2.81% | %/log cycle | Time to Swell (hr) | 26.55 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/29/2019 |
| Centrifuge used | 2 |
| Cup Number | 6 |
| Conducted by | Jenna |

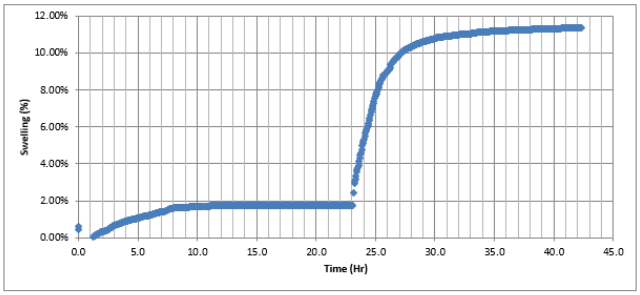
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 2- 4 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 42.04 | g |
| Dry Unit Weight | 15.04 | kN/m$^3$ |
| Height of Sample | 11.613 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 30.76 | g's |
| Sample Height | - | 9.143 | mm |
| Testing Height | 11.343 | 12.566 | mm |
| Void Ratio, e | 0.761 | 0.951 | - |
| Moisture content, ω | 19.3% | 36.7% | - |
| Degree of Saturation | 68.3% | 100.0% | - |
| Change in ω | - | 17.4% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.22 | 2.88 | cm |
| Primary Swell | - | 10.8% | % |
| Ultimate Swell | - | 11.4% | % |
| Volume | 22.99 | 25.47 | cm$^3$ |
| Change in Volume | - | 2.48 | cm$^3$ |
| Mass of Water Lost | - | 8.68 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 62.87% | %/log cycle | Primary Swell | 10.78% | Stress (psf) | 121.4 |
| Slope of Secondary Swelling | 3.64% | %/log cycle | Time to Swell (hr) | 27.70 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/27/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Jenna |

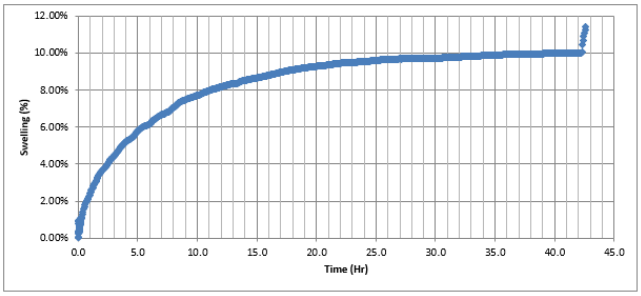
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 37.67 | g |
| Dry Unit Weight | 14.39 | kN/m$^3$ |
| Height of Sample | 10.927 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 45.07 | g's |
| Sample Height | - | 4.990 | mm |
| Testing Height | 10.633 | 11.626 | mm |
| Void Ratio, e | 0.841 | 1.013 | - |
| Moisture content, ω | 19.2% | 36.0% | - |
| Degree of Saturation | 61.6% | 92.4% | - |
| Change in ω | - | 16.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.22 | 3.13 | cm |
| Primary Swell | - | 9.3% | % |
| Ultimate Swell | - | 10.0% | % |
| Volume | 21.55 | 23.56 | cm$^3$ |
| Change in Volume | - | 2.01 | cm$^3$ |
| Mass of Water Lost | - | 17.54 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 6.30% | %/log cycle | Primary Swell | 9.34% | Stress (psf) | 292.5 |
| Slope of Secondary Swelling | 1.78% | %/log cycle | Time to Swell (hr) | 17.64 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/27/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Jenna |

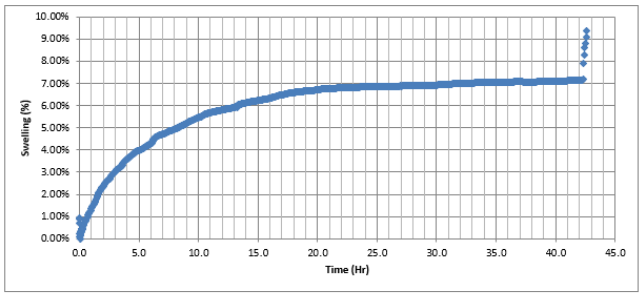
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.10 | g |
| Dry Unit Weight | 13.91 | kN/m$^3$ |
| Height of Sample | 11.074 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 44.74 | g's |
| Sample Height | - | 5.115 | mm |
| Testing Height | 10.896 | 11.630 | mm |
| Void Ratio, e | 0.904 | 1.032 | - |
| Moisture content, ω | 24.8% | 38.0% | - |
| Degree of Saturation | 74.2% | 94.7% | - |
| Change in ω | - | 13.1% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.18 | 2.91 | cm |
| Primary Swell | - | 6.7% | % |
| Ultimate Swell | - | 7.1% | % |
| Volume | 22.08 | 23.57 | cm$^3$ |
| Change in Volume | - | 1.49 | cm$^3$ |
| Mass of Water Lost | - | 15.79 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 4.57% | %/log cycle | Primary Swell | 6.73% | Stress (psf) | 287.7 |
| Slope of Secondary Swelling | 1.21% | %/log cycle | Time to Swell (hr) | 19.42 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/27/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Jenna |

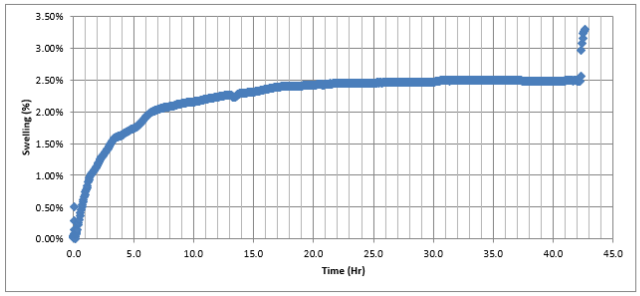
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 60.73 | g |
| Dry Unit Weight | 14.67 | kN/m$^3$ |
| Height of Sample | 16.185 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 44.12 | g's |
| Sample Height | - | 13.240 | mm |
| Testing Height | 16.065 | 16.454 | mm |
| Void Ratio, e | 0.805 | 0.849 | - |
| Moisture content, ω | 24.7% | 31.7% | - |
| Degree of Saturation | 82.8% | 98.9% | - |
| Change in ω | - | 7.0% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 2.74 | cm |
| Primary Swell | - | 2.4% | % |
| Ultimate Swell | - | 2.5% | % |
| Volume | 32.56 | 33.35 | cm$^3$ |
| Change in Volume | - | 0.79 | cm$^3$ |
| Mass of Water Lost | - | 15.14 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.32% | %/log cycle | Primary Swell | 2.42% | Stress (psf) | 452.2 |
| Slope of Secondary Swelling | 0.15% | %/log cycle | Time to Swell (hr) | 14.92 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/27/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Jenna |

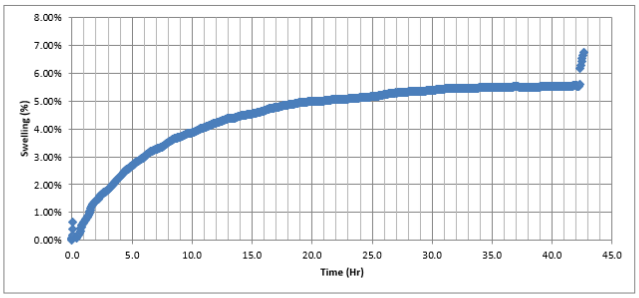
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.44 | g |
| Dry Unit Weight | 14.35 | kN/m$^3$ |
| Height of Sample | 10.739 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 44.47 | g's |
| Sample Height | - | 5.002 | mm |
| Testing Height | 10.454 | 10.967 | mm |
| Void Ratio, e | 0.846 | 0.937 | - |
| Moisture content, ω | 24.0% | 34.4% | - |
| Degree of Saturation | 76.7% | 95.6% | - |
| Change in ω | - | 10.3% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.28 | 2.97 | cm |
| Primary Swell | - | 4.9% | % |
| Ultimate Swell | - | 5.5% | % |
| Volume | 21.19 | 22.23 | cm$^3$ |
| Change in Volume | - | 1.04 | cm$^3$ |
| Mass of Water Lost | - | 14.49 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.97% | %/log cycle | Primary Swell | 4.91% | Stress (psf) | 437.7 |
| Slope of Secondary Swelling | 1.73% | %/log cycle | Time to Swell (hr) | 17.88 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/27/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Jenna |

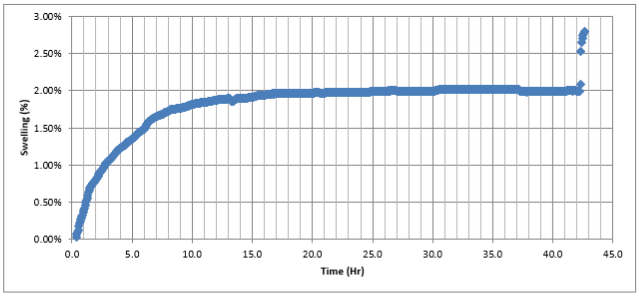
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 56.73 | g |
| Dry Unit Weight | 15.16 | kN/m$^3$ |
| Height of Sample | 14.575 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 45.04 | g's |
| Sample Height | - | 15.805 | mm |
| Testing Height | 14.516 | 14.804 | mm |
| Void Ratio, e | 0.747 | 0.782 | - |
| Moisture content, ω | 24.8% | 32.4% | - |
| Degree of Saturation | 89.5% | 100.0% | - |
| Change in ω | - | 7.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.10 | 2.50 | cm |
| Primary Swell | - | 2.0% | % |
| Ultimate Swell | - | 2.0% | % |
| Volume | 29.42 | 30.01 | cm$^3$ |
| Change in Volume | - | 0.58 | cm$^3$ |
| Mass of Water Lost | - | 20.85 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 1.51% | %/log cycle | Primary Swell | 1.99% | Stress (psf) | 750.4 |
| Slope of Secondary Swelling | 0.01% | %/log cycle | Time to Swell (hr) | 12.47 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 2/27/2019 |
| Centrifuge used | 3 |
| Cup Number | 6 |
| Conducted by | Jenna |

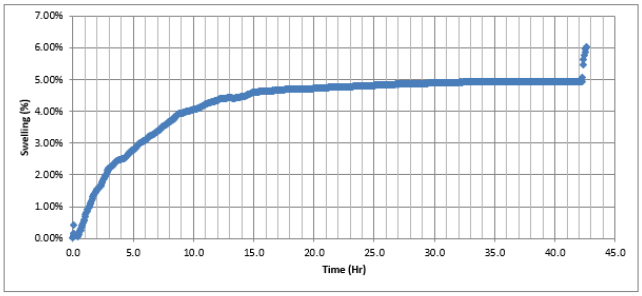
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 4-6 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 38.47 | g |
| Dry Unit Weight | 13.75 | kN/m$^3$ |
| Height of Sample | 11.191 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 44.59 | g's |
| Sample Height | - | 11.581 | mm |
| Testing Height | 10.977 | 11.489 | mm |
| Void Ratio, e | 0.926 | 1.016 | - |
| Moisture content, ω | 23.3% | 34.1% | - |
| Degree of Saturation | 68.1% | 88.3% | - |
| Change in ω | - | 10.7% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 2.34 | cm |
| Primary Swell | - | 4.7% | % |
| Ultimate Swell | - | 4.9% | % |
| Volume | 22.25 | 23.29 | cm$^3$ |
| Change in Volume | - | 1.04 | cm$^3$ |
| Mass of Water Lost | - | 23.93 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 3.81% | %/log cycle | Primary Swell | 4.66% | Stress (psf) | 723.8 |
| Slope of Secondary Swelling | 0.59% | %/log cycle | Time to Swell (hr) | 13.77 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 1 |
| Conducted by | Jenna |

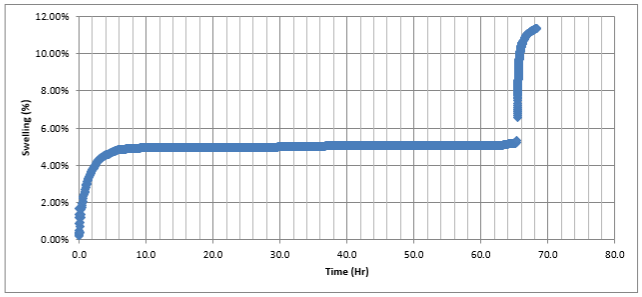
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.69 | g |
| Dry Unit Weight | 13.24 | kN/m$^3$ |
| Height of Sample | 13.279 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 45.96 | g's |
| Sample Height | - | 7.588 | mm |
| Testing Height | 13.239 | 13.897 | mm |
| Void Ratio, e | 1.001 | 1.100 | - |
| Moisture content, ω | 26.2% | 44.7% | - |
| Degree of Saturation | 70.6% | 98.2% | - |
| Change in ω | - | 18.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.17 | 2.55 | cm |
| Primary Swell | - | 5.0% | % |
| Ultimate Swell | - | 5.1% | % |
| Volume | 26.83 | 28.17 | cm$^3$ |
| Change in Volume | - | 1.33 | cm$^3$ |
| Mass of Water Lost | - | 27.60 | g |

NOTES




| | | | | | |
|---|---|---|---|---|---|
| Slope of Primary Swelling | 0.03% | %/log cycle | Primary Swell | 4.97% | Stress (psf) | 288.8 |
| Slope of Secondary Swelling | 0.40% | %/log cycle | Time to Swell (hr) | 29.34 | | |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 2 |
| Conducted by | Jenna |

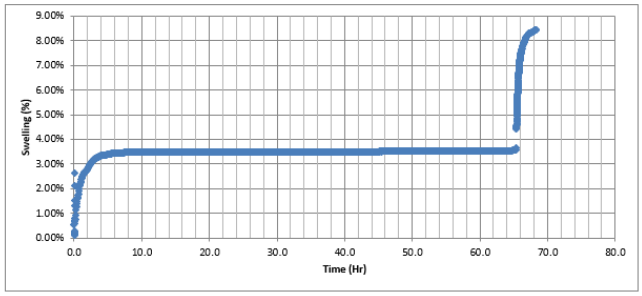
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 43.62 | g |
| Dry Unit Weight | 12.25 | kN/m$^3$ |
| Height of Sample | 13.117 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 45.50 | g's |
| Sample Height | - | 6.824 | mm |
| Testing Height | 13.048 | 13.502 | mm |
| Void Ratio, e | 1.163 | 1.238 | - |
| Moisture content, ω | 32.1% | 47.7% | - |
| Degree of Saturation | 74.6% | 95.7% | - |
| Change in ω | - | 15.6% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.10 | 2.54 | cm |
| Primary Swell | - | 3.5% | % |
| Ultimate Swell | - | 3.6% | % |
| Volume | 26.45 | 27.37 | cm$^3$ |
| Change in Volume | - | 0.92 | cm$^3$ |
| Mass of Water Lost | - | 21.62 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.05% | %/log cycle |
| Slope of Secondary Swelling | 0.54% | %/log cycle |

| | |
|---|---|
| Primary Swell | 3.48% |
| Time to Swell (hr) | 41.83 |

| | |
|---|---|
| Stress (psf) | 288.5 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 3 |
| Conducted by | Jenna |

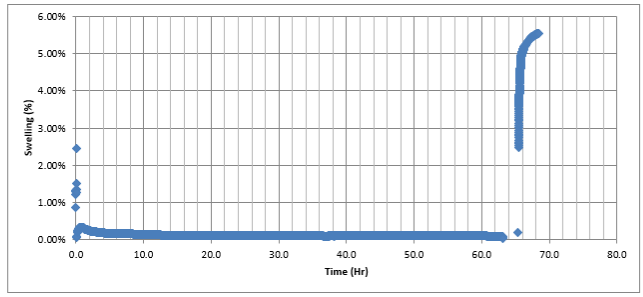
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 44.73 | g |
| Dry Unit Weight | 11.95 | kN/m$^3$ |
| Height of Sample | 14.168 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 45.60 | g's |
| Sample Height | - | 11.410 | mm |
| Testing Height | 14.057 | 14.072 | mm |
| Void Ratio, e | 1.216 | 1.218 | - |
| Moisture content, ω | 28.8% | 46.0% | - |
| Degree of Saturation | 64.0% | 92.9% | - |
| Change in ω | - | 17.2% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 2.61 | cm |
| Primary Swell | - | 0.1% | % |
| Ultimate Swell | - | 0.1% | % |
| Volume | 28.49 | 28.52 | cm$^3$ |
| Change in Volume | - | 0.03 | cm$^3$ |
| Mass of Water Lost | - | 24.27 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.05% | %/log cycle |
| Slope of Secondary Swelling | 0.19% | %/log cycle |

| | |
|---|---|
| Primary Swell | 0.10% |
| Time to Swell (hr) | 44.72 |

| | |
|---|---|
| Stress (psf) | 427.2 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 4 |
| Conducted by | Jenna |

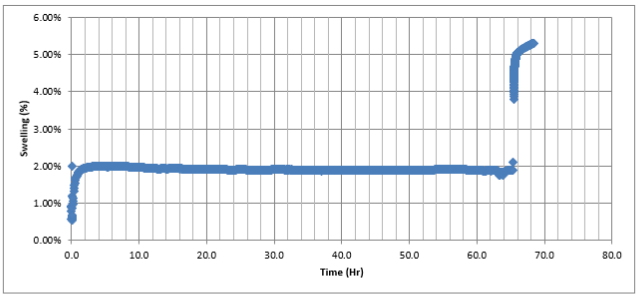
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 45.47 | g |
| Dry Unit Weight | 12.81 | $kN/m^3$ |
| Height of Sample | 13.447 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 45.98 | g's |
| Sample Height | - | 7.421 | mm |
| Testing Height | 13.404 | 13.653 | mm |
| Void Ratio, e | 1.067 | 1.106 | - |
| Moisture content, ω | 28.2% | 40.0% | - |
| Degree of Saturation | 71.2% | 91.7% | - |
| Change in ω | - | 11.8% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.20 | 2.56 | cm |
| Primary Swell | - | 1.9% | % |
| Ultimate Swell | - | 1.9% | % |
| Volume | 27.17 | 27.67 | $cm^3$ |
| Change in Volume | - | 0.50 | $cm^3$ |
| Mass of Water Lost | - | 28.93 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.16% | %/log cycle |
| Slope of Secondary Swelling | 0.52% | %/log cycle |

| | |
|---|---|
| Primary Swell | 1.86% |
| Time to Swell (hr) | 43.83 |

| | |
|---|---|
| Stress (psf) | 434.9 |

Specimen:

Centrifuge Swelling Test

| | |
|---|---|
| Date test conducted | 3/1/2019 |
| Centrifuge used | 3 |
| Cup Number | 5 |
| Conducted by | Jenna |

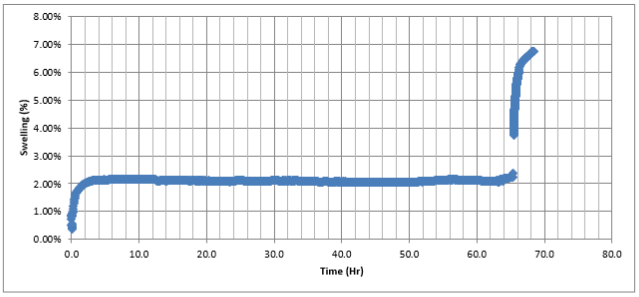
SOIL Information

| Property | Information | Units |
|---|---|---|
| Soil | FM 2 | |
| Boring | B16 | |
| Depth | 8-10 FT | ft |
| Specific Gravity | 2.70 | |
| Mass of Soil | 39.88 | g |
| Dry Unit Weight | 13.66 | $kN/m^3$ |
| Height of Sample | 11.232 | mm |

TEST Results

| Property | Initial | Final | Units |
|---|---|---|---|
| G-Level | - | 45.59 | g's |
| Sample Height | - | 12.387 | mm |
| Testing Height | 11.194 | 11.422 | mm |
| Void Ratio, e | 0.939 | 0.978 | - |
| Moisture content, ω | 26.2% | 39.7% | - |
| Degree of Saturation | 75.4% | 100.0% | - |
| Change in ω | - | 13.5% | - |
| Overburden Mass | - | 0.00 | g |
| Height of water | 4.13 | 1.74 | cm |
| Primary Swell | - | 2.0% | % |
| Ultimate Swell | - | 2.1% | % |
| Volume | 22.69 | 23.15 | $cm^3$ |
| Change in Volume | - | 0.46 | $cm^3$ |
| Mass of Water Lost | - | 41.28 | g |

NOTES




| | | |
|---|---|---|
| Slope of Primary Swelling | -0.16% | %/log cycle |
| Slope of Secondary Swelling | 1.56% | %/log cycle |

| | |
|---|---|
| Primary Swell | 2.04% |
| Time to Swell (hr) | 48.18 |

| | |
|---|---|
| Stress (psf) | 721.5 |

Specimen:

**Centrifuge Swelling Test**

| | |
|---|---|
| **Date test conducted** | 3/1/2019 |
| **Centrifuge used** | 3 |
| **Cup Number** | 6 |
| **Conducted by** | Jenna |

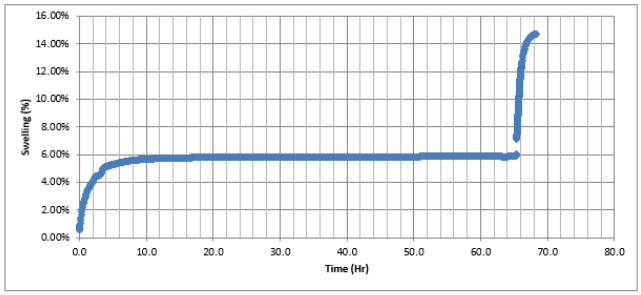
**SOIL Information**

| Property | Information | Units |
|---|---|---|
| **Soil** | FM 2 | |
| **Boring** | B16 | |
| **Depth** | 8-10 FT | ft |
| **Specific Gravity** | 2.70 | |
| **Mass of Soil** | 44.81 | g |
| **Dry Unit Weight** | 13.26 | $kN/m^3$ |
| **Height of Sample** | 12.918 | mm |

**TEST Results**

| Property | Initial | Final | Units |
|---|---|---|---|
| **G-Level** | - | 45.71 | g's |
| **Sample Height** | - | 13.692 | mm |
| **Testing Height** | 12.899 | 13.651 | mm |
| **Void Ratio, e** | 0.998 | 1.115 | - |
| **Moisture content, ω** | 26.8% | 47.6% | - |
| **Degree of Saturation** | 72.6% | 99.4% | - |
| **Change in ω** | - | 20.7% | - |
| **Overburden Mass** | - | 0.00 | g |
| **Height of water** | 4.14 | 2.20 | cm |
| **Primary Swell** | - | 5.8% | % |
| **Ultimate Swell** | - | 5.9% | % |
| **Volume** | 26.14 | 27.67 | $cm^3$ |
| **Change in Volume** | - | 1.53 | $cm^3$ |
| **Mass of Water Lost** | - | 26.67 | g |

**NOTES**




| | | | | | |
|---|---|---|---|---|---|
| **Slope of Primary Swelling** | 0.11% | %/log cycle | **Primary Swell** | 5.83% | **Stress (psf)** | 716.9 |
| **Slope of Secondary Swelling** | 0.61% | %/log cycle | **Time to Swell (hr)** | 45.77 | | |

**Specimen:**

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